

AVIATION WEEK

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MAY 30, 1955

50 CENTS



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World's first 300 mph tire dynamometer, located at B.F. Goodrich's Akron, Ohio plant.



B.F. Goodrich 320 mph dynamometer installed at Wheel and Tire Plant, Topeka, Okla.

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THE STEADY RUMBLE above gives birth to the world's first tire dynamometer, the machine that can put wheels under 300,000 lbs. load. Located at a division of B.F. Goodrich's laboratory of aircraft, friction and environmental forces, it will determine an ordinary tire's wear pattern. After 16 landings—the more than required—the new B.F. Goodrich Tireless Tire is still good for more landings. The tireless wheel and dual tireless combination uses about twice more energy—at much lower air pressure—by stopping approximately 95% sooner going to zero—let the B.F. Goodrich tire bring the plane to a standstill in the

rich exhaust and better for a modern jet because air going through a reduced radius of the aircraft's wing creates a downward force which tends to pull the aircraft down. The resulting loadings at speeds up to 250 and 300 mph.

As top right you see a new B.F. Goodrich tireless Tybless Tire as it stands against the dynamometer's striking dynamic load of 300,000 lbs. load. Located at a division of B.F. Goodrich's laboratory of aircraft, friction and environmental forces, it will determine an ordinary tire's wear pattern. After 16 landings—the more than required—the new B.F. Goodrich Tireless Tire is still good for more landings. The tireless wheel and dual tireless combination uses about twice more energy—at much lower air pressure—by stopping approximately 95% sooner going to zero—let the B.F. Goodrich tire bring the plane to a standstill in the

speeded landing, one which seems a safe stopping distance. The wheel is used to stop the aircraft.

How do you benefit? We can give you faster delivery by speeding up qualification of our tires, wheels and brakes to your specifications. And we give you better landing assemblies because we use machine control to make improvements and design dies. With our new engineering and research facilities, we're looking forward to helping you solve some of your landing and take-off problems. The B.F. Goodrich Company, Research and Test, Akron, Ohio.

B.F. Goodrich
FIRST IN RUBBER

Domestic

Sperry Gyroscope Co. resumed production on a \$30-million backlog of陀螺仪 units last week after 7,000 workers of the International Union of Electrical, Radio & Machine Workers (CIO) voted to accept a four-year contract and end their 15-day strike at three plants on Long Island. The new pact calls for an immediate 5-cent an-hour wage plus an additional 5.5 cents next year.

Ryan Aeronautical Co. received a contract from Curtiss-Wright Corp.'s Aeronautical Division to produce 600 boosters for a "new" engine. Award of the San Diego firm's new contract totals more than \$1 million.

Titanium pilot plane will be built and operated by National Research Corp. at Novato, Calif. under a \$1,193,000 contract awarded by the General Services Administration. Designed to perform L-380 ft of climb in 1 sec., the plane will demonstrate the company's new two-skull process.

Torco Aircraft Corp. received a Navy price contract for a limited number of the Alpha submarine electronic system. It is the first development contract awarded to regular production by the Navy.

Aircraft-General Corp.'s LR61-AJ liquid-propellant rocket is being tested for the first Republic F-104A at Edwards AFB.

H. M. Sawyer & Son Co. was purchased by a group headed by Charles F. Scott, president of the firm's Somers, N.Y., plant, and Charles Scott, with plants at Cambridge and Wrentham, Mass., president of its Wrentham plant.

De Havilland Aircraft Co. will add its first engine Histon 2 on a demonstration tour of the U.S. this summer in an effort to increase customer and short-haul transport sales.

Boeing 707 made its 180th test flight at Seattle May 19, making flight tests of USAF's prototype jet train possible to start this 110 flight hours.

Thiokol Co. has signed a contract with British Lufthansa with 10 navigators for one year for trans-Atlantic flights.

Molotov Airlines and the Air Charter Mechanics Assn. (ACMA) negotiated a



Outboard Powers One-Man Copter

Goodfellow Aircraft Corp.'s new GA-4008 starts its vertical lift on power supplied by a 32 hp. outboard motor. Plans of the small helicopter would be about \$1,000, if produced in quantity. Designed as a home-built, the GA-4008 can fly at speeds up to 68 knots. It weighs 125 lb. empty and carries a useful load of 200 lb. at normal cruising speed of 45 knots; endurance is 45 miles at 72 mph of fuel. First model of the GA-4008 helicopter is making test flights at Goodfellow's Atlanta plant.

wage contract amendment that increases pay by 7 cents an hour across the board. The new agreement will be effective from Aug. 3, 1956, through Oct. 31, 1956.

Financial

Breider Aircraft Corp., Detroit, reports a net income of \$12,951,000 from sales totaling \$184,571,000 for the six months ended Mar. 31, compared with an \$11,111,000 net in sales of \$151,793,000 for the same fiscal period last year.

Armstrong Corp., Jackson, Mich., reported a record \$851,000, in the first half of its current fiscal year, in 1955, compared with the six months ended Mar. 18, 1954. Sales totaled \$18,375,000, a 10% gain.

Capital Airlines' net profit increased to \$501,000 during the first quarter of 1955, compared with a net loss of \$11,000 for the same period of 1954. Passenger revenues increased to \$9,590,000 from \$8,717,000.

Jek & Heintz, Inc., Cleveland, had first quarter earnings of \$599,000 on sales of \$8,000,000, compared with a profit of \$600,000 and sales totaling \$8,987,000 for the same period of 1954. Present backlog of orders: \$12.5 million.

Sperry Corp., New York, declared a

second quarter dividend of 50 cents, payable June 22 to stockholders of record June 1.

McDonnell Aircraft Corp., St. Louis, will pay a regular 25-cent quarterly dividend July 1 to stockholders of record July 17.

Solar Aircraft Co., San Diego, declared a regular quarterly dividend of 25 cents a share on common stock, payable July 15 to holders of record July 20.

International

Australia's Government will order approximately 60 more two-place Vampire jet trainers from the Hawker Aircraft Co. Ltd. Decision to place the sixtieth contract at the company's Brooklands plant prepared in that day after selling out the last of 42 Vampires previously ordered.

Gen. Sir John Copper, 93, English-born pioneer who held Britain's No. 1 aeroship license, died May 24 at Eastbourne, England.

Brahmae Helicopters, Ltd., received two S-55s and spares from Westland Aircraft, Ltd., Yeovil, England.

Swissairline Airlines took delivery on the first Convair 340 of six on order.

The Use of the DEL MAR DELTA Aerial Tow TARGET permits Assessment and Evaluation of MISSILE WEAPONS SYSTEMS!

DEL MAR DELTA recovered by PIONEER PARACHUTES

Professor of Aviation's annual of records and guided missiles is being accomplished efficiently and economically in the Air Force Missile Development Program.

In this instance the Del Mar DELTA high speed, high altitude two-stage guided missile flew to carry Miss-Discipline Flight Test System to the evaluation program and is fully recovered from the test by Pioneer parachutes, to be used over and over again.

This is one of the many examples where the "Pioneer" money is used wisely by the Armed Forces. The design and manufacturing facilities of both the Del Mar Engineering Laboratories of Los Angeles, and the Pioneer Parachute Company have combined to serve both the Armed Forces and the nation's aerospace.

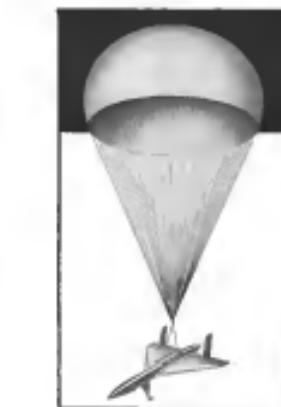
Pioneer engineers are constantly working with engineers of aviation companies, as well as the U.S. Air Force, developing and manufacturing special parachutes for special uses. We are ready to serve you—our engineering staff is available for consultation whenever you may be located.

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The Aviation Week

May 30, 1955

Aeronautical Engineering

Armament Clear Wind Tunnel Thread 18
CAV: Lockheed 226
Orbital Acceleration Type Tests 16
T-33 8 1/2 ft
B-57 and Projected Power Research Project, Lockheed Armed
Precision Engine Mounts Soon 46

Management

Aviation Work Spots Red Air Defense
Executive Statement 13
White Oaklet Society Gains 16
News Briefs 17
Industry Observer 18
Washington Roundup 18

Financial

Aircraft Price List Counter 14
Log on New Awards 15
New Aircraft Exports 15
USAF Contracts 46
Comptelike Books Price Advances 16

Air Transport

President Accepts Rollings
Caption May Get N. Y. Clerks 12
PAA Exercises Still Millions for DC-10 Purchase 13
WPA Opens New Hangar 13
CAV: Lockheed: Defense Clearance 95
SAB: Trans Pacific Flights Sold Out 92
SAB: Boeing First Flight 93
Vanderbilt: New York Local 94
Alitalia: Expands With 100-1000 96
Hawaiian Increases Work 100-1000 97
Hawaiian: Cut by 321 Millions 98
CAB: Airlines 98
Statistics 98

Production

Short Model Republic Contracts 12
PAW: 1000-1000 12
Aerospace Develops West Atlantic Production Delivery 46

Airplanes

Plane Shift: Close Zone of Convective Type Sublimation Review on Market
Editor: Cover 13

Equipment

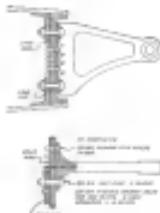
What's New 13

Editorial

Endless in Defense Department 146

Letters 147

WHY SPOT FACE AWAY THE FITTING?



Executive spot facing, weight, and bulk are eliminated from removable fittings such as elbow hinge breakers, when HI-SHEAR and bolts are used to carry the shear loads. On the other example, four bolts speed up assembly of installation of the fitting in the slot as on the right inset.



Fittings using bolts to carry the shear loads, reduce spot facing in slot areas. These fittings must be heavier to withstand retentive strength to avoid excess concentration and are larger in size to achieve full cross section. In comparison, the fitting with bolts requires a weight increase of about 20% and requires removal of installation of an additional fourteen bolts.

WRITE

For the HI-SHEAR Standards sheet for specific data on the HI-SHEAR slot inset.

94-nd Design Aeronautics Department



WHO'S WHERE

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A

F.

Reinke

Retired

Engines

Co.

Leavenworth

Kansas

81

Reindeer

High

Altitude

Test

Flight

Center

1955

Reindeer

High

Altitude



Lightweight General Electric constant speed drive mounts directly to AWD Skyhawk engine's single rear gear.

How G-E drive provides jet engine starting and a-c power from one engine pad

Having only one engine pad available for both jet engine starting and a-c power, Douglas Aircraft faced a difficult problem in the design of the AWD Skyhawk. The flexibility of the General Electric 9 kVA hydraulic constant speed drive permitted the addition of starting gears with no performance penalty and only a small increase in weight.

Ideal for airborne applications, the G-E constant speed drive features a ball piston design that provides

light weight and high reliability due to the small number of moving parts and simple mechanical operation. Drives can be supplied from 9 kVA to 60 kVA for most engine speed ranges.

FOR SPECIFIC INFORMATION on how the General Electric hydraulic constant speed drive can be tailored to your particular application, contact your nearest G-E Apparatus Sales Office.

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Mail to: General Electric Company, Section 6111-3
Schenectady, N. Y. 12345

Please send me these free bulletins:

GE-10179 E-E Hydraulic Constant Speed Drive
GEI-8448 Theory of Operation of G-E Drives

for business's record for reference only

Name _____

Address _____

Company _____

City _____ State _____



9 kVA constant speed drive with engine starter adapter

Washington Roundup

Exit Corney, Enter Burke

Ret. Adm. Adelagh A. "El Kef" Burke, 55-year-old vice admiral of controllers and director sailing, has been selected by President Reagan to succeed Adm. Robert S. Corney, Chief of Naval Operations who clashed with the Administration on the subject. As a rear in Class Corney is scheduled to retire Aug. 16. Following General Matthew R. Ridings, Army Chief of Staff who clashed with the Administration on Army manpower cuts.

Combined commandant of the Joint Chiefs of Staff by the Navy was issued by the President's nomination of Adm. Arthur W. Radford to another two-year term in that post. At the same time he has been called in to participate in the Chairman of the Joint Chiefs of Staff's review of the US Air Force's F-15 program to serve more than five years. USAF Chief of Staff

Chairman of Burke's CNOC, includes advancement to full admiral, puts the 1915珊瑚礁中级军衔 over the heads of 95 officers who entered here in 1947. In addition to his claim to fame as a World War II destroyer leader, he was head of "Operation 23," the organized Navy opposition to USAF's B-56 bomber program.

White House sources said that Corney's retirement does not rule him from future "honor," to the point that Defense Committees would be in a position to attack Corney and Meese is late Aug. 15. Radford's nomination as CNO chairman if the code says he will be eligible. Ridings, now scheduled to head USAF, will leave Sept. 1975, at 57 years old and would be eligible to succeed Radford at that time.

Honolulu Meets AIA

In his first direct approach to the aircraft industry, R. Carl Heusman, new Defense Assistant Secretary of Defense for Public Affairs, appeared at a secret Washington meeting of the Aircraft Industries Assn. Public Relations Advisors Committee with a plan that industry received new "gray area" of undisclosed information which he labels "strategic." Heusman called on PRAC, which already has rejected his invitation to lend him an AIA representative (AW Mar. 2 p. 11), to emerge from his shell and submit a statement of support to his bid for chairman. Committee members suggested that Defense Department should start a public relations office if necessary, and difficulty of continuing their negotiations without disclosed codes. However, this pleased the corporation, reporting Secretary Wilson's intention that new plan will work if it is tried, and urged that industry public relations men confide with his office. Reception to Heusman's proposal was cool.

Trouble for PAA, Bromoff

Prospect is that only two carriers will be left by the last of March to pay Meese and Bromoff salary during under the plan to merge the Civil Service Retirement Board, Pan American World Airways and Braniff Airlines.

The estimated amounts the Board won't be able to pay are \$12 million, Board, \$15.6 million.

Payments to all other carriers, however, will probably be delayed.

Congress said the Board \$8.8 million for release payments for the Apr. 21 to July 1 period—\$6.3 million less than the Board thought it needed.

On advice, CAB decided that the only "strong" bid

to the \$8.8 million was that it should not be used to pay carriers whose payments might be affected by the Board's "offset" decision. PAA and Braniff like the rate, however.

This is what the Board plans to do. The Board is to be used for PAA and Braniff payments. \$3.5 million will go toward meeting PAA's total estimated claims for the period of \$4.7 million, and \$5.6 million will reduce Braniff's estimated \$115.200 total in claims.

* The \$8.8 million will be used to pay all other carriers without priority on their claims (AW 10). The Board thinks its deficit for the period will be substantially less than the \$6.3 million estimated some months ago. For example, permanent Hawaiian operations are already about \$700,000. In addition, the Board won't receive much, if any, net out of fiscal 1966 funds, which will probably be available around mid-July.

PAA is confident the Board will also meet its claims out of new funds for the coming fiscal year.

Procurement Revision

Defense Department has postponed the deadline for receipt of comments and suggestions on its proposed revision of Section XV of the Armed Services Procurement Regulation (AW Apr. 25 p. 11). Originally set for Mar. 21, industry observations now will be received up to June 20. In addition to expected opposition to more stringent control over subcontracting of weapon and munition work, any opposition to that strict objective will be offset by the fact that industry believes that most defense firms will have to review their accounting practices and an alleged discrimination in expenses for general research. Firms predominantly in defense work feel strongly they will be at disadvantage under terms which make "blue sky" research non-allowable risk for contractors who do 75% of their business with non-governmental customers.

Meanwhile, Defense has added new paragraphs to existing ASPR Section XV, clarifying that allowances for depreciation as provided by the Internal Revenue Code will be acceptable for costing purposes on contracts signed after June 1, 1955. Industry reaction is one of optimism, with hope that the waiver is toward a more realistic viewpoint. On the service, the new ASPR paragraph is intended to clear up an existing obscurity point, but the shift in philosophy has been noted as significant.

Subsidy Outlook

The House left the door open for Civil Accountants Board to request additional subsidy funds. The subsidy request was reduced \$23 million by the House Appropriations Committee (see p. 9).

Pointing out in their debate that the committee treated the \$87 million asked by the Board to \$50 million, Rep. Peter Preiss, chairman of the Committee on Appropriations, said the \$50 million may be necessary to meet additional funds for the period of 4½ yrs. The committee recommended a language for the Board to commence assessments during the next fiscal year. The committee feels that this approach to the problem of financing air carrier subsidies is desirable, in that it encourages the Board to take whatever steps may be necessary to protect the taxpayers in handling of these claims."

—Washington staff

President Accepts CAB Alaska Ruling

Eisenhower asks Board to increase Pacific Northwest, Alaska Airlines certificates from three to five years.

Washington, D. C.—The explore Shiro Alaska has been started by President Eisenhower by accepting with little change recommendations of the Civil Aviation Board that certifies of Northwest Airlines, Pacific Northwest Airlines and Alaska Airlines for five years.

The President asked the CAB to issue Pacific Northwest Airlines and Alaska Airlines two year temporary certificates instead of the three year temporary certificates by the Board, and accepted full approval of a merger of the two Alaska carriers.

This is how the White House and CAB actions line the air route pattern between the United States and Alaska at the present time.

* Pacific Northwest's certificate between Portland, Seattle and Anchorage is renewed for five years, adding Fairbanks as an intermediate point.

* Alaska Airlines is renewed between Portland, Seattle and Fairbanks for five years.

* Northwest Airlines' Seattle-Anchorage

certificate is made permanent.

* Northwest's route route between Anchorage and Minneapolis/St. Paul is renewed for three years.

The application of Pan American World Airways for Anchorage as a terminal with Fairbanks is denied, as is a proposed Alaska route by Air Transport Associates.

The Alaska route was submitted in a general investigation of services between the U. S. and Alaska with an emphasis on cutting subsidy of the routes.

The route has become a question of whether there are too many routes serving the same or adjacent areas.

Congressional Rulings

An examiner's report issued last July recommended the routes of Northwest and Pacific Northwest be renewed and the route of Alaska Airlines be discontinued. The two routes made disturbance in Alaska routes and reports indicated that the two had developed a monopoly. Northwest Alaska Airlines has since been merged with Alaska Airlines and PAA ceased its operation of routes from Alaska, the Pacific Northwest and their common regional delegations.

Alaska Airlines was "thoroughly delighted" with the decision on the Alaska route case, according to E. L. Baffett, Alaska delegate, recommending issuance of the route from the Pacific Northwest and Alaska was against CAB's original decision, cutting Alaska and Pacific Northwest out of Alaska routes (AW May 16, p. 12). The T-50 was re-authorized by CAB at 3750 miles, a route specific fuel consumption of 44 lbs. fuel per mile, per lb., and a dry engine weight of 3,000 lbs.

Commercial delegations of the T-50 is Model 501.

R. D. Newell, Alaska general manager, and commercial delegations could begin in quantity by March 1957 but that engine would be made available immediately to customers for commercial aircraft flight testing and CAB certification applications.

Confidence was based on performance during a USAF 150 hr. flight test plus additional testing to cover CAB requirements.

The Transair Route Case, decided

Please Legislators

The President's action in the Shiro Alaska case is likely to take more stress out of the move on Capitol Hill to make Board decisions on route route to terms and permanent fuel, eliminating the proposed revenue authority.

The legislation to accomplish this was introduced in Washington by Sen. Warren Magnuson of the Senate Commerce Committee. This case is a result of the President's original action in the Pacific Coast overruling CAB and then route route between the United States and Alaska via Anchorage by the Washington Airlines, Matanuska and other regional delegations received in Northwest, the Northwest changed its name and enhanced service to Hawaii by Northwest as well as PAA (AW Feb. 14, p. 32). In the Alaska Case, the President's action is in line with the position of the Oregon and Washington delegations.

In a split vote, in the first major proceeding to go through the mill at the White House in the Civil Case, Sen. Wayne Morse participated and his bill drew a mixed verdict with that received the Trans-Pacific Route Case earlier this year.

Approved merger

The CAB recommendations were approved almost without alteration, and the changes made were confined to an extension of the certificates of the two Alaska carriers.

The President agreed, generally with the view of the Board, that a merger of Pacific Northwest and Alaska Airlines would be in the best interest of the two carriers. The Board recommended that Alaska Airlines be merged with Northwest Airlines and reformed to be known as Alaska Airlines.

"While there are certificates right now covering and forbidding such a merger, such certificates could create serious problems for both carriers in the matter of financing new equipment."

"I am concerned that there are other ways that the Board can take within its authority to encourage and facilitate such a merger, and I trust that the Board will take all such steps as are deemed necessary and appropriate."

The President said in his letter

Whistle Blows on Sociologists

London Jet engine power for Trans-World, formerly a national Sociologist, looks with the labor Party during the recent British election, changes that submission of Trans Jet Ltd. by Sir Stafford Cripps in 1944 had not had, until now, full development.

"...I will never forgive myself that I was largely to blame for putting the idea of establishing jet engine production into Sir Stafford's head," said Whittle, who was given full charge of the project by the government. "I am not the man to do that. The modification he added, the Pegasus Jet, has brought a leading British in power its rights to design and make improved engines."

People who have nothing but vague details, imagine, work is delayed, and that does the Whittle engine, which had been growing route under the Ministry of Aircraft Production's styling policies, no help, only when told they would become available.

But he had been advised by the CAB through the Director of the Bureau of the Budget, that a five year extension of Alaska Airlines and Pacific Northwest would better enable them to finance equipment purchases on a sound basis.

In an memorandum, the Board told the President:

"We have now had the opportunity of reviewing the benefits of the new routes in the light of experience, and have concluded that, subject to certain modifications, the current route pattern should be revised for an additional experimental period. In so doing, we have weighed as the one hand the solution of Alaska, the needs of the economy, and the interest of the national defense against the possible increase in mail and passenger revenue from a longer route, and the other hand the Alaska routes. We have concluded that competitive air service between the States and the gateway of Alaska is most conducive to the development of Alaska and is required by the national defense interests, and that these can be best served by continuing the work of the government of maintaining such a pattern."

Disuniting Views

The Board cited a number of factors in recommending removal of Northwest and route route the program out of the industry. The CAB pointed out that such a route route established on the spot of the moment in an emergency, while it can be easily expanded, is already in operation.

Also, according to CAB, the route has shown much improvement and has

developmental possibilities. It is 400 miles closer over the outer Great Circle route between the two Coasts and Anchorage is in route Seattle.

CAB Member George and Deems, disagreed with the majority decision to issue the certificate of Alaska Jet Ltd. by Sir Stafford Cripps in 1944 had not had, until now, full development.

"...I will never forgive myself that I was largely to blame for putting the idea of establishing jet engine production into Sir Stafford's head," said Whittle, who was given full charge of the project by the government. "I am not the man to do that. The modification he added, the Pegasus Jet, has brought a leading British in power its rights to design and make improved engines."

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Reds to John Air Show

Transair—The Soviet Air Force will send "ministers of your own kind" and representatives to participate in next year's International Air Show at Seattle International Air Show, Seattle, Washington, June 25-27. The Soviet air force will have more than 100 aircrafts, including a balance sheet.

"Now that this balance sheet has been supplied by a magazine of high standing in the aviation industry, I again urge that the Administration either confirm or correct the accuracy of this published accounting."

Secretary Wilson's formal statement confirming the accuracy of Transair's account of the Moscow air display occurred the day the Seattle International Air Show was to begin. The Soviet delegation had not yet arrived, however, and the American delegation was not present.

Transair's production box never fit it is certain that it was a point of discussion in the Soviet Armed Services Committee executive session.

Northern, Gray also discussed an renewal of Northwest Airlines' route route.

Gray estimates that extension of the two routes would cost the two \$2 million each, and he very sights prospects of successful operation on them.

Aviation Week Story Spurs Debate On U.S., Red Airpower Positions

Washington, D. C.—Both northern and southern delegations here last week on the Moscow Air Show and on Capitol Hill over the relative development and production rates of U. S. and Russian military aircraft. The battle was opened by publication in *Aviation Week* May 21 of evaluate details on the types and numbers of new Russian aircraft displayed by the Soviets over Moscow only this month. *Aviation Week's* evaluate story, which was inserted in the Congressional Record as part of debate in Sen. Strom Thurmond.

* Defense Department in an official statement denied that the U. S. had lost total superiority to the Russians but noted the one of whether Russians were making the same progress as the U. S. in developing military aircraft and strategic missiles and television programs. What are the latest developments?

* Defense Secretary Charles E. Whittlesey confirmed all the types and numbers of Russian aircraft reported by *Aviation Week* were in fact participated in the Moscow aerial display.

* Senate Armed Services Committee held a preliminary investigation in executive session with top USAF leaders in the areas cited by *Aviation Week* and Sen. Strom Thurmond. Sen. Richard Russell, chairman of the Senate Armed Services Committee, said this preliminary hearing would determine whether the reported "catching up" statement made by Sen. John Sparkman, Johnson, would prove with a full-scale inquiry into the relative position of USAF and Russian air power.

Most important in these publics now is a bar issue of the comparative nations' production which I have asked you to consider in the light of the Russian and the American air power.

* Soviet aircrafts will have more than 100 aircrafts, including a balance sheet.

"Now that this balance sheet has been supplied by a magazine of high standing in the aviation industry, I again urge that the Administration either confirm or correct the accuracy of this published accounting."

Secretary Wilson's formal statement confirming the accuracy of Transair's account of the Moscow air display occurred the day the Seattle International Air Show was to begin. The Soviet delegation had not yet arrived, however, and the American delegation was not present.

Transair's production box never fit it is certain that it was a point of discussion in the Soviet Armed Services Committee executive session.

man's development and production came from Sen. Baruch, Rosell, chairman of the Senate Armed Services Committee; Sen. Harry Jacobson, a member of the Joint Congressional Atomic Energy Committee; Sen. John Kennedy and Sen. Margaret Chase Smith.

Advancement defense is in the ring tide of criticism over its handling of the Russian missile threat and U.S. military air policy was to mostly ignore that Rosell does not yet have all of the elements required for total air superiority. It decided not to proceed with the Lockheed F-104 supersonic day fighter now being built at Burbank.

President Eisenhower's Statements

The following statements on the question of Russian military systems progress were made by President Dwight D. Eisenhower in his press conference held after release of the Department of Defense test on the Moscow missile defense last before publication of Aviation Week's exclusive description of the event May 23, p. 12:

Comments by President Dwight D. Eisenhower

Mr. President: Senator Stratton wants to know whether this country has been surprised by the test in Russia. Do you think so?

Answer: Well, I think any good government, "But control of the net."

Another voter, representing another voter, asked: "What is the status of the missile, and anybody with a certain amount of time in service can give me some idea of when they choose to concentrate on us, and for a given span of time, as they grow up, of time, even in the face of great great general superiority on the other side."

The President did it to us so late on Jan. 5, 1941. Those of you who were in the European theatre at that day will remember what a dreadful air war it was. Russia we later destroyed a good deal of that attacking force.

Now, as of today, most of you people are rather familiar with the character of our Air Force, including strategic character.

Back in about 1948-49, we began to look briefly these B-52s, well, it was a situation almost, it was so acute that they gave us a big interconnected bunch of the same time that we knew that the day of the big jet bomber was coming along.

But you have to understand of different needs on particular types. Now, these B-50 planes were good planes for that day, and they are now being phased out as well as the B-47s.

So in the very new cases, since with this provision of this intercontinental bomber, we had a chance to work for a really for type in the B-52 and its successor, which will certainly come along, we are not have as many B-52s as we should like at this moment.

I don't know the exact numbers, but to say that we have lost so a pending off of the great transoceanic development and technical excellence as well as the results in our total record is not true.

Comments by Martin S. Hayden, Defense News

Mr. President, going back to the six point question, apparently Senator Stratton was more interested in a report that is Moscow they had seen a flight of new intercontinental bombers or something of the sort.

I would like to say, sir, like these have any Russian air development reported that has shown up just previous planning as to Russian as strength? In other words, have you any general history of any of the Russian air development?

Answer: Well, this is the point that this time to come, in a certain kind of evidence, sensible people, myself and others, have come up with some that exceeded predictions of what—where they would be at any particular moment.

Now, I remember of exposing the statement that was raised in that speech, and I've forgotten the details of it, so I want to be a little bit more pointed in my speech, but do know that they have just—they didn't say on May Day, you know, 4, we just—well, when—but in particular for the May Day they flew over several times, a number of flights, among which were a few of those which, by the use of their engines, the use of the aircraft, would certainly be capable of long-distance flight, carrying heavy loads.

Now, when their condition is finite, when their evidence of technical perfection and all the things that we have go into out of their things, nobody knows.

Sen. Stratton seemed to remember Senator Wilson of withholding "the math" from the American people about Russian air progress.

He and Mr. Wilson only released information about Russian air developments when forced to do so by poor unofficial disclosures or congressional protest.

Sen. Stratton was referring to Mr. Wilson's detailed disclosure on May 24 of the new types of planes observed over Moscow.

Wilson, in a editorial in the *Democrat* and *Progressive*, asserted that the United States was maintaining "a major military superior to that of any potential enemy."

Sen. Stratton, facing back at Wilson, and he had never asserted that Russia had gained any superiority over the U.S. What he is fearful of, the senator said, is that Russia "is in the process of surpassing us."

Sen. Stratton and "one of the bad things about the present situation is that Mr. Wilson is not giving the truth to the American people until forced to do so."

Sen. Stratton, Air Force Secretary in the Truman Administration, said that Wilson had not given the information about the Russian planes had been known for some time.

"If that is true," Stratton said, "why didn't he release it before instead of waiting until the pressure was on him?"

Sen. Jackson and Wilson "fail to tell the American people that our lead is only temporary."

"Based on Russian airplane progress so far," Jackson said, "it is only a matter of time until they will be able to surpass us in the air."

The best proof that Wilson is not telling the full story will come when the Air Force is compelled to step up its production of B-52 bombers and other jet-type planes," Jackson said.

Light Weight Orpheus Completes Type Tests

London-Bristol Orpheus turboprop designed for light weight fighters has completed an 18-hour type test at a cost of £185,000. The engine weighs 746 lb. for a thrust-weight ratio of 4.4, highest any British engine to pass the R.A.F. test.

First Orpheus test was on Dec. 17, since then, it has completed at least five engines, all now available for test runs.

Among these is one rated between 5,000 and 5,900 lb., and weighing less than 1,025 lb., for a thrust-weight ratio approaching 6. Rolls-Royce said its expandable turboprop has a 6:1 ratio, but is a short life engine, and does not need to qualify at 150 hr.

Aircraft Firms Lead Contract List

Aircraft and related industries were the lead's of Defense Dept. rated prime contractors in the 38 months from July 1, 1953 to Dec. 31, 1954, and Defense Secretary Charles E. Wilson expects they will continue to dominate defense contracting.

Firms retained last year, by the Pentagon, for 100 firms receiving largest and regular orders of Defense Dept. aircraft and related sub-contractors are listed on page 60. The top 11 firms in total are small aircraft manufacturers, which alone received more than 40% of the total dollar awards.

Top rank went to United Aircraft Corp. and its sub-contractors. They sold \$3,051.1 million of equipment which includes Pratt & Whitney engines, Sikorsky helicopters and Hamilton Standard propellers. United's share of the total defense contract business in the period was 6.7%.

Other leading firms were Douglas, North American, Boeing, Lockheed, General Dynamics (Convair), Grumman, Curtis-Wright, Republic, Hughes and Martin.

Secretary Wilson and he is confident

that the existing aircraft companies are substantially competent to meet our cost U.S. responsibilities. He indicated that the trend is toward more domination of the field by the specialized prime contractors and that in case of another national emergency there will be less utilization of the field by non-prime contractors on out-of-field contracts.

Defense Dept. figures were compiled at the request of congressional committees. Accompanying the list of awards from 1953 to 1954 is the total defense contract business in 1955 which was \$10.6 billion, down 10% from 1954.

These companies, including 12 in the aircraft and related fields, for the most part had suffered contractions and cutbacks in the post-Korean period.

No data was given out on backlog, but the Defense Department and most of these firms still maintained among the most conservative of all military budgets despite the fact that they did not figure in the list of 100 top new contractors in late 1953 and 1954.

Top contract was shown in General Motors Corp., since the government's

Lag on New Awards

Here is a list of corporations in the aircraft and related industries who were awarded contracts in the 38 months from July 1, 1953 to Dec. 31, 1954, but not among the top 100 in awards made in the following 12 months. The letter "C" in the column refers to cost, credit, the negative amount left after cancellation and refunds assumed new procurement awards made in the period.

Rank	Company	Amount	Percent
1	United Aircraft Corp.	\$2,011,000	6.7
2	General Motors Corp.	1,614,000	5.0
3	Douglas Aircraft Co.	1,555,000	4.9
4	Boeing Aircraft Co.	1,520,000	4.8
5	Lockheed Aircraft Corp.	1,480,000	4.6
6	General Dynamics Corp.	1,477,000	4.7
7	Convair-Cessna Engineering Corp.	1,371,000	4.2
8	Curtiss-Wright Corp.	1,359,000	4.2
9	Republic Aviation Corp.	1,355,000	4.2
10	Hughes Tool Co.	1,323,000	4.0
11	General Electric Co.	1,266,000	3.9
12	Aerospace Telephone and Telegraph Co.	1,083,000	3.3
13	Radius Aviation Corp.	916,700	2.9
14	General Electric Co.	824,700	2.5
15	Fairchild Engine and Aircraft Corp.	730,000	2.3
16	Spruce Corp.	1,658,000	5.0
17	General Metallurgical Corp.	1,657,000	5.0
18	General Electric Co.	1,657,000	5.0
19	Standard Oil Co. of California	1,611,000	4.9
20	Standard Oil Co. of California	966,000	3.0
21	Standard Oil Co. of California	934,000	2.9
22	Standard Oil Co. of California	934,000	2.9
23	International Machine Mfg. Corp.	916,000	2.9
24	Radius Corporation of America	712,000	2.2
25	Avco Manufacturing Corp.	666,000	2.0
26	General Electric Co.	655,000	2.0
27	Avco Manufacturing Corp.	584,000	1.8
28	Avco Manufacturing Corp.	584,000	1.8
29	Avco Manufacturing Corp.	584,000	1.8
30	Avco Manufacturing Corp.	584,000	1.8
31	Avco Manufacturing Corp.	584,000	1.8
32	Avco Manufacturing Corp.	584,000	1.8
33	Avco Manufacturing Corp.	584,000	1.8
34	Avco Manufacturing Corp.	584,000	1.8
35	Philips Petroleum Co.	534,000	1.6
36	Avco Manufacturing Corp.	534,000	1.6
37	Avco Manufacturing Corp.	534,000	1.6
38	Avco Manufacturing Corp.	534,000	1.6
39	Avco Manufacturing Corp.	534,000	1.6
40	Avco Manufacturing Corp.	534,000	1.6
41	Thompson Products, Inc.	482,000	1.5
42	Massachusetts Institute of Technology	480,000	1.5
43	Beech Aircraft Corp.	393,000	1.2
44	General Precision Electronics Corp.	393,000	1.2
45	Bryce and Tamm, Inc.	344,000	1.1
46	General Tire and Rubber Co.	344,000	1.1
47	Beech Instrument Corp.	325,000	1.0
48	Continental Motors Corp.	315,000	1.0
49	Titan Water Associated Oil Co.	315,000	1.0
50	General Precision Corp.	315,000	1.0
51	Metals Corp.	308,000	1.0
52	Cities Service Co.	287,000	0.9
53	Washington Air Rides Co.	255,000	0.8
54	Pan American World Airways	235,000	0.8
55	General Mills, Inc.	235,000	0.8
56	General Scientific Instrument Co.	212,000	0.7
57	Stevil Oil Co.	203,000	0.7
58	James Madison University	193,000	0.6
59	Fairchild Camera and Instrument Corp.	123,000	0.4
60	Gilliland Brothers	123,000	0.4
61	General Machine Tool Co.	121,000	0.4
62	General Oil Corp.	90,000	0.3
63	Stearns Vacuum Oil Co.	92,000	0.3
64	Grumman Aircraft	177,000	0.6
65	Grumman Aircraft	177,000	0.6
66	Grumman Aircraft	177,000	0.6
67	Grumman Aircraft	177,000	0.6
68	Grumman Aircraft	177,000	0.6
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95	Grumman Aircraft	177,000	0.6
96	Grumman Aircraft	177,000	0.6
97	Grumman Aircraft	177,000	0.6
98	Grumman Aircraft	177,000	0.6
99	Grumman Aircraft	177,000	0.6
100	Grumman Aircraft	177,000	0.6

Intergovernment defense supplies. Cancellations of contracts with GM exceeded new procurement from the company by nearly \$60 million.

Companies Among 100 Largest Military Contract Winners

Companies in aircraft and related industries awarded among top 100 firms in net value of military prime contract awards made in the 38 months from July 1, 1953 to Dec. 31, 1954.

Rank	Company	Amount	Percent
1	Thompson Products, Inc.	\$82,000	0.3
2	Massachusetts Institute of Technology	48,000	0.2
3	Beech Aircraft Corp.	39,000	0.2
4	General Precision Electronics Corp.	37,000	0.2
5	Fairchild Camera and Instrument Corp.	36,000	0.2
6	Kaiser Aluminum Corp.	35,000	0.2
7	General Machine Tool Co.	34,000	0.2
8	Grumman Aircraft	33,000	0.2
9	General Precision Corp.	32,000	0.2
10	Grumman Aircraft	31,000	0.2
11	Grumman Aircraft	31,000	0.2
12	Grumman Aircraft	31,000	0.2
13	Grumman Aircraft	31,000	0.2
14	Grumman Aircraft	31,000	0.2
15	Grumman Aircraft	31,000	0.2
16	Grumman Aircraft	31,000	0.2
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96	Grumman Aircraft	31,000	0.2
97	Grumman Aircraft	31,000	0.2
98	Grumman Aircraft	31,000	0.2
99	Grumman Aircraft	31,000	0.2
100	Grumman Aircraft	31,000	0.2

White Outlines Soviet Technical Gains

The following statement by General Thomas D. White, vice chief of staff of the U. S. Air Force, is considered by Aviation Week Editors to be an accurate exposition of the relative positions of American and Russian technologies as applied to development of intercontinental ballistic missiles and atomic weapons. Made by an authority in military affairs, it is important evidence on the controversy over the comparison of Russian and U. S. intercontinental ballistic missiles. Before it was made before a joint audience in Pittsburgh as an Armed Forces Day speech, Aviation Week is presenting the text of General White's statement in a series in its regulars.

"... Our main problem today is to maintain a position of strength. Much of our strength must be military. Our defense establishment must fulfill its basic role.

"First, we must have the forces to meet and beat an attack if one should occur today. This emphasizes the importance of strength being...

"Second, we must keep up our effort for the strength for an extended period, ten-to-twenty years or perhaps even longer. I stress the word *effort*. Long ranges of planes, pods, and missiles would be worthless unless they are effective against an enemy, and in the effective they must be superior. This means we must develop weapons systems that keep us ahead of the enemy.

Longer Forces

We must be ready at any time and for a long time. Meeting these needs poses a difficult issue: difficult that is, if you have ever lived in history and seen longer and more effective peace-time forces than we have ever had.

In the year after World War II the Soviets were building up their forces while we were reducing ours. They outnumbered us in men, guns, tanks and planes. They did so. But despite their great numerical advantage we won, and still are the main obstacle to their aggressive aims. Their massive tank and their many planes have been a powerful menace in the European war areas. But these forces have not been capable of exerting strong military pressure directly against the United States.

On the other hand, the United States had the means of exerting and may continue directly against the vital centers of the Soviet Union. The fact that we had the ability while they did not get them in an intense strategic position. Although their ambitions for conquest were not diminished, they were wary of starting anything that might result in retaliation by the full power of the United States.

"Today with this situation the Soviets look for a way out. The answer was obvious. The path was for them to put real pressure on the United

States to produce its first weapons. In greater volume and at less cost than either nation. We have seen the lesson in technology and industrial development for many years. However, our great strength has been more along the lines of production rather than innovation. Many of the key scientific breakthroughs of this century were made in England, France, in Germany.

"Now here we always been first in the development of military weapons. We were not the first to have tanks. We were not the first to have jet aircraft. In the end, however, our production has not kept with large amounts of scientific weapons and...

"The situation we face today points to believe that we are bound to win any technological race, particularly with the Soviets. This is a dangerous assumption. We must be careful not to overestimate our strength and underestimate our effectiveness. It has become belief to believe that we are bound to win any technological race, particularly with the Soviets. This is a dangerous assumption. We must be careful not to overestimate our strength and underestimate our capabilities.

"In the declined leadership of the United States seems unorganized, some take it for granted that Soviet technology is superior and backward. Although many admit that the Soviets have produced some fine aircraft, aircraft and even a few connectors, we are often amazed by Soviet claims of technological and flight performance. In truth, the Soviets do not do this very well. In fact, most people are convinced that because of our great record in the past we will continue to outperform and outproduce everybody else in the future.

"This is a comforting thought, but it may prove to be disastrous in war. The records of the past few years indicate that our technological lead is by no means still persisting.

Soviet Military

"The Soviets are showing signs of technological maturity. Many of the things they produced they could not do, they did. Even though they are producing some of the things they were supposedly unable to do at all, they did not do it, but they did it in a less basic way. For example, we thought they could not duplicate the B-29 in less than six or seven years. They duplicated it in two years.

"We estimated that it would be difficult for them to make a good copy of the British jet engine. They produced a better version of this engine in less than a year.

"In the past, some experts thought they could not produce an atomic bomb in less than six to ten years, if at all. They tested the world with a nuclear explosion in about three years. This is just about the time it took the United

States to produce its first weapons

"Now it is true that all these accomplishments were for the most part duplication. They were not original achievements. But they duplicated and even improved upon some very complicated weapons. This is significant. As a nation requires the technological ability to duplicate complex weapons, it becomes capable of building and using original weapons.

Rapid Production Progress

"We have seen examples of this. The MiG-15 was not the superior aircraft to the F-86. But who can deny the fact that it was a first-class fighter, and in many ways, an original design? Even more important, could a involved technology produce 15,000 of these modern jets in just a few years?

"Then one has the MiG 17, an aircraft comparable to the F-100, but far superior to our newest fighters. We now longer the MiG-15 because the 17 is replacing it. That has now thousands of these new models.

"Although another unusual flight with their MiG-21 show, we see two new models of fighters during rehearsals for the Army Air Corps in 1954. Gen. White's diplomatic assignments have taken him to Moscow, Peking, Russia and the former in Berlin, where he is an adviser to the German air force.

"You may say, 'well, they have concentrated on fighters.' But this is not the case. They are developing and producing the planes for a great bomber force.

"Last year we observed a completely new nuclear bomber. We expected the right development, but we took a long time to get into production. But this year they showed enough of these in make us realize that they were serious in production. These are great steps of progress.

Soviet Threat

"That the airplane that gets us and forces for victory lies in the United States is the long range jet bomber. The Soviets have no use for a long range bomber except to attack the United States. Last year we see one Soviet model. This year we see numerous others of them in operation.

"These observations establish a new basis for our estimate of Soviet production of the heavy jet bombers and the medium jet bomber. This knowledge is evidence of the modern technology of the Soviet aircraft industry and the advances which are being made to these.

"We must continue to be on the alert and examine our own forces to ensure the lead over the Soviets to be long.

"The Soviets may have started slow, but they are learning fast.

"The national resources needed in a war for technical superiority are not God-given endowments like minerals,



General Thomas D. White, Vice Chief of Staff of the U.S. Air Force.

nor production of trained people is not increasing.

"Russia is making rapid progress. The Soviets have come from a period in which most of their population was illiterate, to a point where their present output of scientists and engineers exceeds that of the United States. This means areas where they have gained leadership.

"Of course, they did not have to start from scratch. They had the experience of a sizable production base. They had scientists and engineers of their own and they borrowed large numbers of German scientists and engineers who were experts in the field of aircraft and missiles.

"Furthermore, their population is larger than ours is about 15 times. This gives them a greater educational potential, which they can be expected to use to the limit.

"There are some cold facts. In 1950, the United States produced 50,000 aircraft. The Soviet Union produced 50,000 aircraft in 1952. Last year we produced 150,000 aircraft. By contrast, the Russians produced 20,000 aircraft in 1950, 40,000 in 1953 and 50,000 in 1954. Russia now has almost caught up in total number of aircraft and has passed us in total number of aircraft. These figures are nothing to be optimistic about.

Sound Information Position

"Of course, questions can be raised about the quality of the Soviet aircraft. The Soviet aircraft industry has the advantage that our young men are brought up in a machine-age environment. They start up a lot of technical knowledge. But the Soviets work their students harder.

"In summary, we had the lead in scientific manpower. We had the lead in training, if we had not already given. We are giving it, if we have not already given. The Soviet aircraft industry has the advantage that our young men are brought up in a machine-age environment. They start up a lot of technical knowledge.

"These observations establish a new basis for our estimate of Soviet production of the heavy jet bombers and the medium jet bomber. This knowledge is evidence of the modern technology of the Soviet aircraft industry and the advances which are being made to these.

"We must continue to be on the alert and examine our own forces to ensure the lead over the Soviets to be long. "Training now to another phase of technological innovation, we find the Soviets have a marked advantage over us. This scientific base allows the Communists to hold on to their technical and theoretical discoveries. First nations cannot share them.

"In contrast, the United States and free nations are liberal with technical information. This is an advantage of the democratic system. Besides, we believe that exchange of information aids scientific and industrial progress. I do not believe that all science we have made are based on sound reasoning, but I believe our portion of freedom of information is sound.

"However, we must recognize that we are giving a price for this freedom, just as we must pay the price for other



KB-39 THUNDERFLASH goes up to the flying bases of Boeing KB-39P tankers for serial refueling of its first tank, which further cuts in losses. The Republic F-105 Thunderchiefs at altitude of highest low-altitude day or night mission. Their T-38Cs merely flew from Tokyo to Australia nonstop with 3 aerial refueling. (AW May 24, p. 71)

freedom we enjoy. The price is the Soviet profit from our efforts.

Shorter Lead Time

A final point is the comparison of Soviet technological progress with ours in speed of production. I do mean the speed of aircraft production and assembly. I am referring to what we call lead time—the whole period from invention of a weapon through developing, test flying and finally a combat capability. With the combat weapons of today, lead time is a matter of years.

There is also evidence that the Soviet technological structure is simpler and more streamlined than ours. Their programs are controlled by military necessity and the majority of getting ahead. Ours are somewhat confused by domestic programs of financing-making and rationalized by the need for economy.

Whatever the reasons are, we do know that they have produced first-class equipment and their lead time versus the lead is shorter than ours.

"On our side we have cut down some of our bottlenecks. In the Air Force we have recognized and stressed lead our research and development activity.

"This has saved valuable time, but there are other bottleneck factors that are not in our control.

For example our budget cycle. However, because this pattern of budget going on, it is unfortunately ours in getting lead.

"Our desire to build safety into our equipment and the need to keep equipment in service for a long time has tendency to build multi-project wrip-

ots—all these lengthen our weapon lead time.

"We must do everything we can to reduce it. Under United States policy we will not start a war. The Soviet war is a war of aggression, against many countries. By contrast, the Soviets can choose their time and thus strategy and want to wait it. They can select particular weapon systems and put in a cash program. By concentrating in this way they may be able to develop programs in specific areas. The danger is that they may do this in areas that can be decisive.

Need for Break-Through

"There is no comparison, I would say, between our own technological effort and Soviet lead time." Undoubtedly he believes it would be to assume that we will eventually keep the lead. Technical superiority is not automatic. It must be made to happen.

The lead is in addition to a \$5-billion lead agreement, negotiated with India in 1953.

In his report of first quarter results, Tropp and the Soviet results represented an increase of 21% over the first three months of 1954. Passengers flown during the period gained 36%.

He also forecast air traffic between the United States and foreign countries would be the greatest in history during 1955.

PA's chief executive backed up that prediction with charts showing that the pattern on soaring an increasing share of international and overseas travel from the United States.

Airlines earned an all-time high of 50% of the total international revenue last year, Tropp said, and Pan American's share of the 1954 market was 15% of all passenger traveling abroad on both air and sea carriers.

Right at the travel division that is made to take the lead, the airplanes that can fly, and the ships that are able to take. Our strength is going to a should follow the lead, but we go on trying to get better weapons. Our strength is probably absent. But it must change as our combat strength changes, and so we get the idea for some new weapon system.

"Despite the improving strength of the Communists, our prospects for the future look bright. We can fail to win the technological battle only if we fail to recognize its importance.

"Unless we keep up our efforts to do strength we will have no shield to cover our future developments."

PanAm Will Borrow \$60 Million For DC-7s

Pan American World Airways has completed a \$60-million, 25-year financing arrangement to cover procurement of an order for 40 Douglas DC-7s (AW May 2, p. 46).

The DC-7s represent a total investment of a \$110 million.

PAA President John T. Tripp revealed the new loan last week at the airline's 27th annual meeting of stockholders in New York. He also reported Pan Am's commercial revenues increased to an all-time high of \$46,087,000 during the first quarter of 1955.

Pan American will borrow the \$60 million from 18 commercial companies as participants are due on 50 DC-7Cs and seven DC-7Bs. The international air carrier said a 25% interest on the new loans would be paid, and that three out of four participants should be able to cover the remaining 75% with new financing arrangements.

The loan is in addition to a \$5-billion lead agreement, negotiated with India in 1953.

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TYPE D-471



TYPE D-565



TYPE R-145

A Few Typical EEMCO Products

TYPE D-634 450 cycle, 756 HP AC, motor/actuator module, duty cycle to drive a hydrostatic pump on a directed path. 756 ft-lbs in 0.3 seconds at 4.5 HP with 2250 rpm, 150 degrees at 1.5 HP. Has continuous rating of 5 HP at 2000 rpm, 15.8 degrees, 250 with 1756 lbs.

ESTATE ACTUATOR TYPE D-471 double universal rotary power package, operates in one small confined module, radio radio Miles, magnetic clutch and brake, main selection gear and末尾 gear for driving adjustable lead position. Light weight and precise motion. Has a wide variety of power, life requirements, driving. Resulting clutch to drive small rotary or linear actuators, singly or in multiples. Continuous duty only 756 ft-lbs x 2.6°. Weight 10 lbs. The specifications may be varied to suit typical requirements.

ESTATE ACTUATOR TYPE D-565—Designed as a leading edge actuator for jet fighters. It has a maximum load limit of 25,000 pounds and a 10° lead position. Weight 100 lbs. Has a maximum torque limit of 14,000 ft-lbs at a 20 rpm D.C. input. 10.75 degrees. Maximum cyclic load 75,000 pounds. Weight 250 lbs. Design incorporates variable power take-off and load position limit stops.

SHAKE ACTUATOR TYPE D-145 has unique motor actuator in rotary cell housing. The motor clutch planetary reduced gear and gear system are all enclosed within the actuator outer cylinder. Type D-145 has an unusual long stroke of 0.625" or 1.7" per second under a normal load of 400 lbs on a 20 volt D.C. system. Maximum operating load is 6500 lbs, maximum stroke limit 35,000 lbs. Our German Type D-145 has equivalent load and speeds, non-pulsating and does not heat up when in continuous use when also stops are reached, or load exceeds a preset limit. Weight 10 lbs. 5-1/2

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when ONLY ROBINSON SHOCK and VIBRATION CONTROL for AIRBORNE EQUIPMENT

Only Robinson will do when, for best performance, you must have complete protection of valuable equipment against shock or vibration —

Or, when you must save weight and cost of a device, and only greater protection will make this possible. *You can't build a thing stronger or lighter than the latter is by far the more economical procedure.*

Note that even the latest specifications for shock and vibration control are becoming obsolete, because of the rapidity of aeronautical progress.

Unprecedented engine power, speeds, and extremes of temperature subject electronic equipment to conditions never before encountered.

Unless these sensitive devices are fully and properly protected, their performance is interfered with, and their service life shortened.

At stake are no less than the safety of pilots and passengers, the performance of civil and military aircraft, and huge deterioration costs of equipment.

In the military field, it is not too much to say that the performance of jet aircraft and guided missiles is limited by the degree of protection afforded their control mechanisms. *The success of a mission — the defense of an area — may stand on the performance of shock and vibration control mechanisms.*

WHAT TYPES OF CONTROLS ARE AVAILABLE?

Starting with crude rubber and springs, progress in shock and vibration control has now reached in one and only one method for energy dissipation, which has all the following elements:

1. Degree of control: compression, with shock or vibration to be controlled.
2. Multiple-degree absorption — i.e., handling of shock and vibration from every angle.
3. Isolation: reduction of heat and cold and the presence of oil, gas, or other deleterious influences.
4. Resonance against installation: energy reduction of installation tone.
5. Long intended and unchanging performance of mounting.
6. Effective reduction of bulk, weight, and cost of equipment produced, from 15% to 35%.

Only in Robinson's metal mounts and Mac-Flex Expansion Systems are all six of these controls available. A direct comparison between Robinson and any other method under consideration will quickly prove the presence or absence of these vital characteristics.

THE INADEQUACY OF SPRINGS

Springs alone, or combined with auxiliary dampers, whose design do most of the work, have been discarded by the Robinson resilient cushion concept. Spring-damping combination fails because:

1. They are linear in action, and unable to cope with varying loads, or to afford protection against dynamic overloads.
2. They vary in performance with altitude and reduced atmospheric pressure and when bent, at low temperatures, when surface friction between spring and damping devices.
3. Their service life is definitely limited.

HOW ROBINSON ALONE OVERCOMES THESE DIFFICULTIES

The fundamental advantage of all Robinson shock and vibration control is the dissipation of energy by resilient fabrics which are resilient carbons and thick pads of polished Mac-Flex.

These fabrics, which are exclusive with Robinson, have the following advantages:

1. They possess inherent damping throughout, nearly five times greater than rubber.
2. Their interfacing wire loops resist compression progressively as the load increases.
3. They are highly effective in multi-directional design and application.
4. They are completely unaffected by changes in atmospheric pressure, high or low temperatures, oil, gas, moisture, or other deleterious influences.
5. They provide ample protection against dynamic overloads.
6. Their service life is indefinitely enhanced.

Note that in the Robinson Mac-Flex, the spring that surrounds the Mac-Flex resilience acts as a resonator, and handles only a small part of the work to be done. It is the resilience that carries the load.

WHAT ARE ROBINSON SYSTEMS?

Years of engineering experience applying shock and vibration controls to more than 300 aircraft and commercial aircraft have taught us that each job is a separate and individual problem. Good as the Robinson resilient cushion is, our engineered systems are not made simply by attaching a number of mounts to a job. Using the experience accumulated in the design of the cushion, Robinson engineers designs each shock and vibration control system for the work to be done — the maximum performance and protection of the equipment involved.

WHO USES ROBINSON?

Robinson is a leading supplier to the Government of shock and vibration control systems for the protection of airborne electronic equipment. Robinson Systems are in almost one in practically every military and commercial aircraft now flying and in a number of guided missiles. Hundreds of designs are now being produced for commercial to include aircraft of the future. Robinson Systems are used by against the leading manufacturers of military and civilian mobile ground equipment, by makers of light and heavy machinery, and by producers of shipping and carrying machinery.

WHAT IS ROBINSON'S HISTORY?

Robinson has pioneered in the solution of shock and vibration control problems since 1936, calculating in the development of the revolutionary Mac-Flex cushion first introduced in 1939.

In 1947 Robinson received from the Navy Department the award for "outstanding cooperation and assistance in producing for the Naval Service new and radically different shock mounts, which greatly decreased electronic equipment damage due to vibration."

Since that time, many have been in all-military aircraft and systems in multi-directional mounting. In fact, Robinson has quadrupled production for 4 years, in fully engineered protection. Years of research, laboratory work and practical applications have justified Robinson Mounting Systems to cope uniquely with the formidable problems involved in our defense operations. Robinson now supplies both the aerospace and the industrial fields, serving as clients by both Eastern and West Coast engineering units.

The business of Robinson Aviation, Inc. has increased 10-fold in the past four years.

A WORD OF WARNING

Robinson success and the pressing need for effective shock and vibration control have created a demand for a large number of new materials and associated systems which are distinctly unsuited for the job that must be done. It will take much development and testing to determine, *they may not fulfill the initial requirements of this job and trouble sign.*

Robinson seeks only a clear definition of the work to be done, and an engineering appraisal of all available devices suited to doing it. *It is not this clever comparison that Robinson wishes his clients to learn.*

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FASTENER PROBLEM



Type 34043A, for temperatures to 400°F.



Type 34044A, for temperatures to 500°F.

Strong, self-locking threads for tapped holes in soft metals

Tapped holes in soft metals have long presented problems to aircraft manufacturers. Threaded nuts, especially, are considered unreliable and are susceptible to stripping. Bolts made of harder alloys have a partial solution. Such metals, however, have a tendency to shear loose under vibration, or to break out when the bolt is removed. The only alternative is to tighten them with a secondary fastening device such as a key or a "Dolchlock" pin which then presents a difficult and costly service problem. In cooperation with aircraft and aircraft engine builders, ESNA has developed a new fastener problem. Type 34043 and Type 34044 self-locking fasteners are self-locking, permanently and automatically. They are made of a vibration-proof steel threaded fastener that develops AN torque loads, is repeatedly self-tightening, yet can be easily removed with simple tools.

Early mounted in an NC-2 tapped hole, using simple tools, the Type 34044 fasteners are locked in place by the interference action of the pointed Lock Thread and nuts, which return the socket threads to the equivalent of a perfect interference fit.

The manually threaded sections are one of two thoroughly-proven ESNA self-locking devices. For temperatures up to 200°F, the new bonding is available with the famous red nylon locking collar. For service between 200°F and 500°F, a thin locking collar has been tested on many types of ESNA high temperature fasteners. These locking collars, made of field-moderating techniques, are made in sizes #10 through #32 and the locking devices provide performance and reliability per Specification AN-N-868 and AN-N-304.

Type 34043 head bolts can be installed in any metal whose hardness is less than 35 Rockwell C. Threaded sections can be machined, ground and heat-treated. Self-locking techniques and field-moderating techniques are used. And because Lock Thread sections of threaded locking sections, less than 50% of the base of the cutting, edge distance or base size is required... resulting weight savings.



Lock Thread sections eliminate metal base areas of socket threads to give direct interference fit. The thin locking collar is bonded to the threaded section. Self-locking threads can be installed in any metal whose hardness is less than 35 Rockwell C.

MAIL COUPON FOR DESIGN INFORMATION



Electro-Screw Nut Corporation of America
Dept. 107-215, 2500 Vassar Road, Hoboken, New Jersey

Please send me the following free Service Information:

Details of type 34043 locking
 How to thread a threaded collar
 What self-locking feature would you suggest?

Name: _____
 Address: _____
 City: _____ State: _____ Zip: _____

Packaged Vacations Boost Talon Bookings

Transocean Air Lines' packaged vacation line is keeping its ports full. The airline has found it hard to find up to approximately 100 plane loads so far this year. Its four schedule is presently booked to capacity, though regularly.

With the rapid growth after only three years of offering the service, Talon believes there is a greater potential in its vacation package. The airline figures every service organization and big company in the U.S. is a prospect.

So far, Transocean has gone no farther from its Orlando base than Salt Lake City to pick up passengers. But requests have come in from as far east as Milwaukee and New Haven, back.

Transocean stepped up its travel agency service to the Southwest and Northwest Orient Airlines cut their flights rate to \$125. Talon reduced its tariff from \$171 to \$139. By purchasing the standard Hawaiian tour in wholesale lots and reselling at cost, the airline is able to offer a less-expensive vacation.

An eight-day tour out of Santa Barbara costs \$287. This includes a double hotel room, transportation to and from the airport, city taxes in Hawaii, three meals a day and a "taxi." Transocean estimates as a dividend would pay \$400 more for the same vacation.

Lead factors on Talon's tour line are packed about 70% through April 15. May through September lead factors are expected to continue to about 90%.

Plane utilization also is good. The tour DC-4 average about 12 hours a day, climbing from a low point that seldom is below 10 hours to 15 and 17 hours at the peak summer season.

Light VHF Receiver Sells for \$99.50

A small VHF receiver, priced at \$99.50, is being produced for lightplane owners by Amherstronics Electronics, Inc., Raleigh, N. C. Weighing less than 1.5 lb., Model 300 receives over 210 frequencies. It covers the 108-118 mc. range and can be operated with LFV receiver or with the Amherstronics Model 273 modulator/power unit.

The new receiver is said to be free of "hot" spots at any level of frequency (one exception). A switch adjustment on the panel enables setting threshold of audio sensitivity to any level in a range of 1 to 100 microvolts.

Exclusive distributor for America is Air Amherstronics, Inc., Teterboro, N. J.



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which resist vibration...

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WHO'S WHERE

[Continued from page 9]

Harold M. Nata, manager of New contracts and New Subsidiaries, assistant chief salesman, Ford Instrument Co., Long Island City, N.Y., division of Sperry Corp.

Robert D. Fugley, manager of the new engineering laboratory established at Pasadena, Calif., by Hanafi-Henley Corp.'s Arctic Division.

Donald J. McHugh, engineering manager, Perry Gossen Co.'s Arctic Arctic Division.

Donald H. Viles, manager of fiscal program representing Reliance Aviation's West Coast region.

Joseph Rizzo, Washington public relations representative, General Dynamics Corp.

Joseph E. Merz, assistant manager, South West Airlines Co.'s jet engine overhaul operations at Dallas.

Charles E. Kamm, former senior executive, Hennepin Steel Products Co., Newark, N.J.; Philip L. McDowell, formerly manager of aircraft maintenance, Teterboro, N.J.; Arthur C. Hartman, assistant plant manager of the AerMetz Products Division.

J. A. Mueller, West Coast manager of technical sales service, Remco Division, Inc.

Charles T. Fazekas, military sales representative, AC Spark Plug Division of General Motors.

Donald E. Bush, Detroit Detroit sales manager, Newark, Alberta, Ltd.

Bob Niles, policy relations representative at Kansas City, Mo., for Trans World Airlines.

Arnold E. Kaus, sales manager, General Precision Supply Co., St. Louis.

Oliver V. Melvin, Jr., New York district sales manager, Northwest Orient Airlines, Des Moines, Iowa.

Joseph Elson, Western region manager, Korch Division, Remco Co., Los Angeles, Calif.

Donald W. Melvin, system application engineer, Northwest Delta Airlines.

Mike Dillenburg, general sales manager, Vostech Manufacturing Co., Cedar City, Calif.

Marvin A. Babette, distributor sales representative, Southwest American Co., Dallas.

Walter B. Vassell, sales and service manager, McCauley Industries Corp., Dayton.

Walter W. Banks, eastern regional sales manager, Trans-Canada Air Lines.

Edgar H. Hiltner, passenger traffic manager, California City Airlines.

Kenneth Helford, eastern regional supervisor and Walcott D. Kistner, assembly supervisor, shops supervisor, Aeromex, Inc., Miami, Fla.

John G. Helms, assistant controller manager, Northwest Airlines Division, Rockford, Ill.

Andrew W. Melvin, Jr., liaison from Pan American World Airways to America at head of the maintenance training school in Barrington, Colorado.

George T. Easdale, military sales representative for AC Spark Plug Division of General Motors, Pauls Valley.

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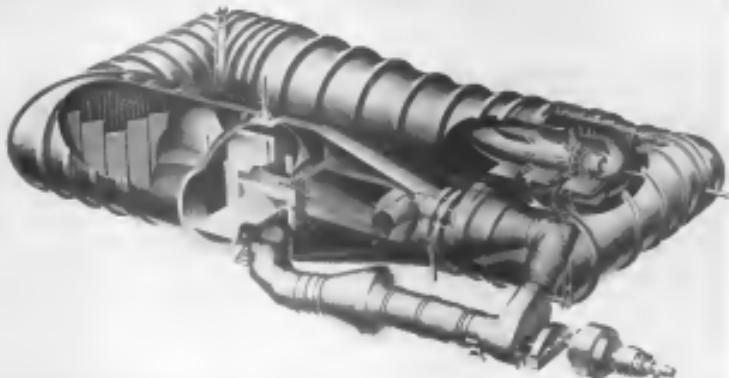
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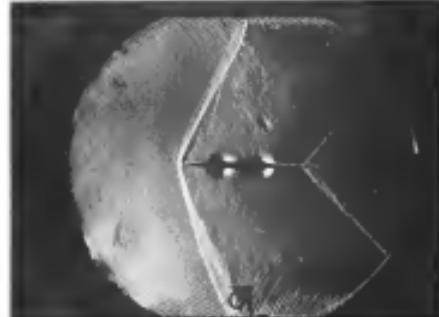
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TRANSonic THROAT of modified Cornell Aero Lab tunnel will be 8 ft. square and, like present 3x4 ft. version, will use peristaltic walls.

Scientists Clear Wind Tunnel Throats

By David A. Andersen



REFLECTIONS OFF WALL from shock wave at Mach 1.26 are visualized by peristaltic throat in Cornell tunnel. Alternate shock and expansion waves at wall merge quickly

The lag of transonic tunnel testing trials has not yet been completely ended.

Two operations on the basic throat of the modified Cornell throat and performed by scientists at the National Advisory Committee for Aeronautics, have improved current operations with a pair of transonic wind tunnels.

At Cornell Aeronautical Laboratory, a perforated throat reduces the interference of shock waves reflected from the sound walls, permits the use of larger test models to give more accurate test results.

At Boeing Airplane Co., downstream deflection of entry down-tilted Boeing wings—augments the power required for the high-speed testing.

The Theory

Behind these two achievements lies a long history of development and a technological breakthrough. The development began before 1942 at NACA, the breakthrough was the con-



BOEING BABY TUNNEL in one-tenth scale, with variable development test

cept of the variable throat, conceived and developed by John Stach and his associates in 1946.

Before then, transonic tunnel testing was impossible. There were some trials to get limited numbers of test points, but full range, although aerodynamic research was impossible.

The reason lies in the characteristics of wind tunnels and of transonic flow.

Any obstacle stuck in a pipe—say a small model or, for that matter, a single edge—will modify the flow. It's possible to block the flow completely if the obstacle is big enough, if it is smaller than the diameter of the pipe, the air is rushing through the pipe must speed up to keep the flow constant.

A test model partially blocks the wind tunnel test section. If the model is small enough, and the flow is slow enough, there is no trouble. Make the model larger and the upstream higher, and the trouble begins. The cross-sectional area of the test section is smaller at the model than it is upstream, the air must accelerate to get past the model. To prevent separation of the air, a local shock is formed at the model.

But when the shock forms at the model—because local flow has reached sonic speed even though the tunnel upstream has low-flow characteristics—change. For all practical purposes,

the model won't operate any faster without an enormous expenditure of extra power. The flow in the model is not an accurate picture of the flow that exists in the free-stream tunnel speed.

The formation of the local shock and its consequent blocking of the tunnel is called "blockage."

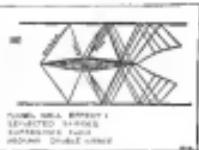
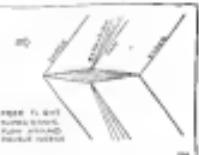
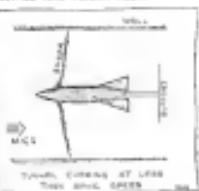
However, blockage is not the only problem. Out of the worst, when planes need tunnel testbeds and they don't have them, the shock will, in accounting for the effect of the walls.

Wind tunnel walls confine the flow and expose a rigid outer envelope on the hub of air passing through. Sudden flow discontinuities that have to curve to get around the test model return that curvature at a considerable radial distance from the model. If the model is small and the test section large, the free wall interference is maximum. But for large models and smaller sections, the free interference is diminished by the presence of the walls.

Now comes the really bad part. The free interference between the moving stream of air and the rigid air envelope outside the test section. That interference tends to distort the flow, also, but in a sense opposite to the wall effects.

Different flow conditions at supersonic speeds also present problems because of the wall effects. Shock waves

TUNNEL AND FLIGHT FLOW

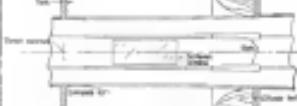


generated in the nose of the model are reflected from the walls and become the free-stream discontinuities in the free-stream downstream. If the reflected waves hit the model, the free-piston model becomes nonconvergent and the test results can be nothing.

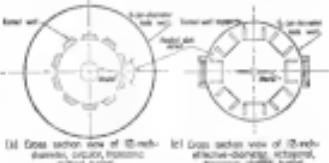
Removing the walls doesn't solve the use either. Instead of a compression wave issued at the nose, expansion waves form in the free-field inside the tunnel tube to adjust to the pressure of the free stream. These expansion

waves issued from the walls and free-stream are the free-stream discontinuities in the free-stream downstream. If the reflected waves hit the model, the free-piston model becomes nonconvergent and the test results can be nothing.

Removing the walls doesn't solve the use either. Instead of a compression wave issued at the nose, expansion waves form in the free-field inside the tunnel tube to adjust to the pressure of the free stream. These expansion



(a) Schematic diagram of transonic slotted tunnel.



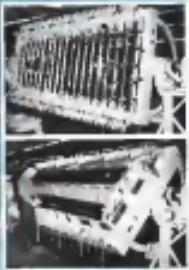
(b) Cross section view of 10-mesh slotted, upstream, transonic, slotted tunnel

(c) Cross section view of 10-mesh effective-cone, upstream, transonic, slotted tunnel



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which also can be reflected and reduce the test.

Considering these objectives, it seems that wider normal tunnel increments the model would have to get smaller in the speed increments.

It would have to be smaller or cross sections must be more choked and to overcome wall interference at otherwise speeds, it would have to be shorter at otherwise speeds to avoid interference with the reflected shock.

As a matter of fact, under the old scheme, the model would have been roughly, small at Mach 1. These frustrating facts started the idea of glazing that led Stael, and his associates in the aero that revolutionized wind tunnel testing and made it a technological break-through possible.

It was a simple solution, but not at all obvious. The answer was to worth the test section of the wind tunnel by covering skin on the tunnel walls in direction of flow. These then sharply bypassed the model and the test section.

The skin reduced the model blocking interface to nearly zero and choking did not occur. The consequence of some compression shocks and some expansion waves, pointed to a set sort of created refractions for propagation testing. Although this did not completely prove out.

Thus was a basic transonic Mach number could be increased by a factor of three and variations in Mach number could be obtained with power variation.

Design of the transonic flow got under way in 1948. NACA was giving one of its most valuable wind tunnels and millions of dollars on the study and refinement of its tests of supersonic flow.

The first transonic tunnel operations began in late 1950 at the Langley Laboratory at NACA. A few months later, the second tunnel was completed.

Now, both Langley and the Ames Aerodynamic Laboratory of NACA have these useful tools.

Cornell Tunnel

With more than two years of transonic test experience, Cornell Aeronautical Laboratories is currently loaded with a backlog of 1,000 test hours scheduled for the year. The tunnel is an open circuit type, CAL operating at 100,000 cfm. The test section fitted with the 54-12-B variable diameter tunnel, has a about 60' width x 10' maximum 10 ft square transonic test section.

Cornell's tunnel is based on the same principle that gave the NACA its transonic tunnels. But there is a refinement aimed at reducing even further the effects of reflected shocks.

Supersonic flow is discontinuous, abrupt, unpredictable. Unfortunat-

"OUT OF THE ORDINARY"
HYDRAULIC AND PNEUMATIC
EQUIPMENT PRODUCED BY LOUD



Space and performance requirements have made it more and more necessary to produce specialized components for modern aircraft. The required standard pieces of equipment often do not exist. Many are now being developed.

Valve tools are pressure regulating valves which flow up to 500 cfm at 40 to 450 psi air and controls pressures within a range of less than one psi.

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*Source - Aviation Week Second Report.

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93%
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1. First half of 12-page feature engineering article, "Scientific Detectors Major New Engine Sales Create Mystery," by Scatter Engineering Editor David A. Anderson.



69%
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81%
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the compression and expansion waves generated by the closed and open ports of the throat are not cancel each other, and there are some reflections back across the test section. The more slots there are, the relatively weaker each reflection is.

This leads to consideration of a porous throat. Suppose, instead the Cessna section, the throat were perforated with lots of tiny holes instead of the larger slots. Then the expansion and compression waves would be weak, close together and could cancel easily.

Small-scale tests were begun in 1950 with various throat shapes, and later repeated with various sizes of perforated throat to approach a practical throat loss. These tests started in 1952. By late 1957, the first test section was in operation. These were the first perforated wall tests in the country.

Conair engineers say that the perforated wall works in other ways to increase the efficiency of the throat.

The test section is surrounded with a plenum chamber which can be evacuated with a vacuum pump. This is equivalent to increasing the area of the test section and controls the Mach number by controlling the amount of pressure air.

Conair found that it about half divides the transonic throat work, the industry's remaining work is divided among themselves, the USMAF and Army Chemical Corps.

When the 100% transonic throat is available, it will operate over a Mach number range continuously variable from zero to 1.3. Model speeds up to 9 ft. will be handled in the new section.

Boeing Tunnel

Development of Boeing's transonic hot tunnel started right after the first supersonic flight was made from NACA in 1948.

Today Boeing operates an 8x12 ft. tunnel with a fixed throat, and tests its supersonic and transonic flow speeds right through into the supersonic range in the same test section.

Recently redesigned, the tunnel uses a downstream section—the "Boeing flap"—to reduce power requirements for transonic operation.

As which passes out of the slot at the throat enters a plenum chamber and must be jetted efficiently to the tunnel throat area for real transonic power requirements. Boeing engineers developed a steady down flow system to do this, and located that just downstream of the test section. This is as long as the test cell to vary the flow conditions for re-circulation and can bring out the aerofoil to choke the tunnel.

The door was selected as an alternative scheme to filler blocks, placed downstream of the test section and last-

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Today American Welding supplies flash butt-welded rings to every U. S. jet engine manufacturer. Our modern plant is equipped to perform not only rough ring operations, such as forming, welding and string, but also whatever machining job may require.

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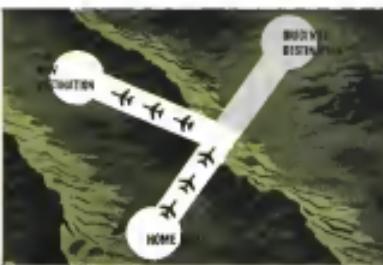
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3 LONG RANGE! The Bendix Bearing and Range Indicator System has an effective operating radius of 1,000 miles . . . more if a new "long hand" can be picked up as a reference. System accommodates true air speeds from 200 to 1,200 knots and wind speeds up to 200 knots.



4 SUITED TO ALL AIRCRAFT! Because it can be tailored to any engine or true air speed system, the Bendix Bearing and Range Indicator is flexible enough to use in any aircraft. Its extreme compactness and light weight make it particularly suitable where size and weight allowances are at a premium.

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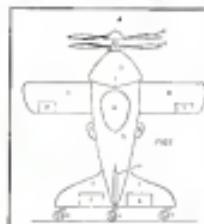
ing the actual air passage back into the tunnel before the planes. The bearing flap itself is to be the more efficient attitude indicator than the older.

For example, with their little development model—a 1/20th-scale model of the big flap—with bearing a good lead during the bearing flap orientation. The original started test evaluation development, plus the configuration tests on the 20-centre down were tested first in the small tunnel.

THRUST & DRAG

Indian Patent 27362 is held by a Mr. Mitra, the chief aeronautical engineer for Hindustan Aircraft Ltd. Mitra received the patent in 1948, which was rather early in the game to be thinking about VTOL aircraft.

But that's what he had been doing. Mitra's drawings show an open-tailplane, straight wing airplane with control propellers in tail sections and an adjustable pilot's seat. He proposed shifting weights to shift the center of gravity and thus change the ratio for vertical and horizontal flight.



The patent sets the primary object of the design as to enable vertical take-off without tilting, and landing with little tilting, depending on the relative wind strength. Another object, says the patent, is to enable an airplane to hover.

Vance Braatz, British Airways' senior 12 mph faster than anybody else. Braatz, however, believes Adelco's stock would be too much for the mag, according to his letter to AW (p. 55).

The idea was that commercial products giving great pitch which is a little movement left and right and are not true to the original wing sections as laboratory developed by propeller Finsen claims.

So Adelco scrapped all the cast heads and stuck in some softening

and smooth running. As an example, he cited the recording of one plane's report which said, "and . . . The autopilot stuck without any warning at all and was damaged."

The report was changed to read, "A more definite, still warning would enable pilots to explore fully the often excellent flying characteristics of this aircraft."

And in a couple of years, there's been poor RAF pilot training for the new defense still warning that never comes. Measurements over at the local at Bremerton, engineer and AAEF pilots are driving Adelco in a spirit of good-will and smooth running—DPA

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Many characteristics of a specific alloy can be improved by vacuum melting and casting... for properties that limit an alloy's potential are removed. Tensile and impact strength, stress rupture strength at elevated temperatures, and fatigue life can all be substantially improved... and creep and brittleness minimized by vacuum melting.

HOW CAN I BEST USE THESE IMPROVED ALLOYS?

Frankly, vacuum-melted metals are so new that many applications for them have not yet been explored. But where they have been used, they've proved their effectiveness in improved performance. Superalloy jet engine turbine blades, for example, have given more than twice the performance life of blades made of conventional melt-metals. And ball bearing rejects dropped from 60% to 3% when vacuum-melted steels were used.

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WEST GERMANS GILBERATE action of sorcery with flight of possessed Moths

Bonn Flies First Powered Plane

Bonn—Less than a day after Germany had staged her sorcery, the first German-made powered plane, named the Motha, was in the air at Bonn-Hangel Airport. It was not yet pointed and the undercarriage was not completed, but German engineers felt they could not wait a day longer after having been forced down flying for 10 years.

It was possible to "heat" the plane and then cool it down because a jet undercarriage, plus a propeller, was used. The water was converted into a propeller-driven aircraft by installing a 10 hp Volkswagen engine.

The plane was designed and built by the Bonn firm of Motha Pastore & Co.,

the Munich glider designer Rohr, and a group of plane enthusiasts.

The aerodynamic design of the Doppeldecker glider, with its long pointed qualities, was left unchanged, and only the structure was adapted to the new requirements. The plane is a trussairer. Wingspan is 41 ft., wing

area is 194 sq. ft., keeping the aircraft, in mind, the wing loading must be extremely low. Flying speed is 60 mph., maximum flying speed is 81 mph.

Since the plane is also designed for training purposes, a second set of undercarriage is installed. There is only one main stabilizer, which can be operated by both occupants.

After the first, the aerodynamics, too, "We have not yet forgotten the first flight," says the Motha Pastore, "but at a sacrifice between 13,000 and 13,500 deutschemarks (\$2,810 and \$2,100). If we get enough radius to start operating on a large scale, we think we can reduce the cost to 10,000 deutschemarks."

This, in addition to the extremely low operating cost of 5 deutschemarks an hour, should be a strong incentive for the many plane enthusiasts in Germany and abroad for whom the other sports planes now offered by foreign companies are too expensive.

Armour Flame-Sprays Ceramic Coatings

A method of flame spraying aluminum oxide and aluminum oxide ceramic as an aerial coating for high temperature protection has been developed by Armour Research Foundation of Illinois Institute of Technology, Chicago.

The technique, which appears to be similar to one developed by Alcan Research Co. (AM, Apr. 26, 1954, p. 38), permits flame spraying onto the hot lead to be flame proof without unduly heating the metal base.

The coating has great temperature and chemical stability.

In many cases, the underlying metal can be melted without causing

failure of the coating, according to

Samuel W. Bradford, of the foundation's research and special research department.

He notes that the

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Volume 44 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 24,492,000 to 25,071, Part II, sub. nos. 25,072,000 to 25,650, Part III, sub. nos. 25,651,000 to 26,229, Part IV, sub. nos. 26,230,000 to 26,808, Part V, sub. nos. 26,809,000 to 27,387,160.

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Volume 46 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 30,284,000 to 30,863, Part II, sub. nos. 30,864,000 to 31,442, Part III, sub. nos. 31,443,000 to 32,021, Part IV, sub. nos. 32,022,000 to 32,600, Part V, sub. nos. 32,601,000 to 33,179,160.

Volume 47 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 33,180,000 to 33,759, Part II, sub. nos. 33,760,000 to 34,338, Part III, sub. nos. 34,339,000 to 34,917, Part IV, sub. nos. 34,918,000 to 35,496, Part V, sub. nos. 35,497,000 to 36,075,160.

Volume 48 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 36,076,000 to 36,655, Part II, sub. nos. 36,656,000 to 37,234, Part III, sub. nos. 37,235,000 to 37,813, Part IV, sub. nos. 37,814,000 to 38,392, Part V, sub. nos. 38,393,000 to 38,971,160.

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Volume 50 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 41,868,000 to 42,447, Part II, sub. nos. 42,448,000 to 43,026, Part III, sub. nos. 43,027,000 to 43,605, Part IV, sub. nos. 43,606,000 to 44,184, Part V, sub. nos. 44,185,000 to 44,763,160.

Volume 51 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 44,764,000 to 45,343, Part II, sub. nos. 45,344,000 to 45,922, Part III, sub. nos. 45,923,000 to 46,501, Part IV, sub. nos. 46,502,000 to 47,080, Part V, sub. nos. 47,081,000 to 47,659,160.

Volume 52 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 47,660,000 to 48,239, Part II, sub. nos. 48,240,000 to 48,818, Part III, sub. nos. 48,819,000 to 49,397, Part IV, sub. nos. 49,398,000 to 50,076, Part V, sub. nos. 50,077,000 to 50,655,160.

Volume 53 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 50,656,000 to 51,235, Part II, sub. nos. 51,236,000 to 51,814, Part III, sub. nos. 51,815,000 to 52,393, Part IV, sub. nos. 52,394,000 to 53,072, Part V, sub. nos. 53,073,000 to 53,651,160.

Volume 54 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 53,652,000 to 54,231, Part II, sub. nos. 54,232,000 to 54,810, Part III, sub. nos. 54,811,000 to 55,389, Part IV, sub. nos. 55,390,000 to 56,068, Part V, sub. nos. 56,069,000 to 56,647,160.

Volume 55 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 56,648,000 to 57,227, Part II, sub. nos. 57,228,000 to 57,806, Part III, sub. nos. 57,807,000 to 58,385, Part IV, sub. nos. 58,386,000 to 59,064, Part V, sub. nos. 59,065,000 to 59,643,160.

Volume 56 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 59,644,000 to 60,223, Part II, sub. nos. 60,224,000 to 60,802, Part III, sub. nos. 60,803,000 to 61,381, Part IV, sub. nos. 61,382,000 to 62,060, Part V, sub. nos. 62,061,000 to 62,639,160.

Volume 57 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 62,640,000 to 63,219, Part II, sub. nos. 63,220,000 to 63,798, Part III, sub. nos. 63,799,000 to 64,377, Part IV, sub. nos. 64,378,000 to 65,056, Part V, sub. nos. 65,057,000 to 65,635,160.

Volume 58 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 65,636,000 to 66,215, Part II, sub. nos. 66,216,000 to 66,794, Part III, sub. nos. 66,795,000 to 67,373, Part IV, sub. nos. 67,374,000 to 68,052, Part V, sub. nos. 68,053,000 to 68,631,160.

Volume 59 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 68,632,000 to 69,211, Part II, sub. nos. 69,212,000 to 69,790, Part III, sub. nos. 69,791,000 to 70,369, Part IV, sub. nos. 70,370,000 to 71,048, Part V, sub. nos. 71,049,000 to 71,627,160.

Volume 60 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 71,628,000 to 72,207, Part II, sub. nos. 72,208,000 to 72,786, Part III, sub. nos. 72,787,000 to 73,365, Part IV, sub. nos. 73,366,000 to 74,044, Part V, sub. nos. 74,045,000 to 74,623,160.

Volume 61 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 74,624,000 to 75,203, Part II, sub. nos. 75,204,000 to 75,782, Part III, sub. nos. 75,783,000 to 76,361, Part IV, sub. nos. 76,362,000 to 77,040, Part V, sub. nos. 77,041,000 to 77,619,160.

Volume 62 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 77,620,000 to 78,209, Part II, sub. nos. 78,210,000 to 78,788, Part III, sub. nos. 78,789,000 to 79,367, Part IV, sub. nos. 79,368,000 to 80,046, Part V, sub. nos. 80,047,000 to 80,625,160.

Volume 63 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 80,626,000 to 81,205, Part II, sub. nos. 81,206,000 to 81,784, Part III, sub. nos. 81,785,000 to 82,363, Part IV, sub. nos. 82,364,000 to 83,042, Part V, sub. nos. 83,043,000 to 83,621,160.

Volume 64 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 83,622,000 to 84,201, Part II, sub. nos. 84,202,000 to 84,780, Part III, sub. nos. 84,781,000 to 85,359, Part IV, sub. nos. 85,360,000 to 86,038, Part V, sub. nos. 86,039,000 to 86,617,160.

Volume 65 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 86,618,000 to 87,197, Part II, sub. nos. 87,198,000 to 87,776, Part III, sub. nos. 87,777,000 to 88,355, Part IV, sub. nos. 88,356,000 to 89,034, Part V, sub. nos. 89,035,000 to 89,613,160.

Volume 66 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 89,614,000 to 90,193, Part II, sub. nos. 90,194,000 to 90,772, Part III, sub. nos. 90,773,000 to 91,351, Part IV, sub. nos. 91,352,000 to 92,030, Part V, sub. nos. 92,031,000 to 92,609,160.

Volume 67 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 92,610,000 to 93,189, Part II, sub. nos. 93,190,000 to 93,768, Part III, sub. nos. 93,769,000 to 94,347, Part IV, sub. nos. 94,348,000 to 95,026, Part V, sub. nos. 95,027,000 to 95,605,160.

Volume 68 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 95,606,000 to 96,185, Part II, sub. nos. 96,186,000 to 96,764, Part III, sub. nos. 96,765,000 to 97,343, Part IV, sub. nos. 97,344,000 to 98,022, Part V, sub. nos. 98,023,000 to 98,601,160.

Volume 69 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 98,602,000 to 99,181, Part II, sub. nos. 99,182,000 to 99,760, Part III, sub. nos. 99,761,000 to 100,339, Part IV, sub. nos. 100,340,000 to 101,018, Part V, sub. nos. 101,019,000 to 101,597,160.

Volume 70 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 101,598,000 to 102,177, Part II, sub. nos. 102,178,000 to 102,756, Part III, sub. nos. 102,757,000 to 103,335, Part IV, sub. nos. 103,336,000 to 104,014, Part V, sub. nos. 104,015,000 to 104,593,160.

Volume 71 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 104,594,000 to 105,173, Part II, sub. nos. 105,174,000 to 105,752, Part III, sub. nos. 105,753,000 to 106,331, Part IV, sub. nos. 106,332,000 to 107,010, Part V, sub. nos. 107,011,000 to 107,589,160.

Volume 72 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 107,590,000 to 108,169, Part II, sub. nos. 108,170,000 to 108,748, Part III, sub. nos. 108,749,000 to 109,327, Part IV, sub. nos. 109,328,000 to 110,006, Part V, sub. nos. 110,007,000 to 110,585,160.

Volume 73 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 110,586,000 to 111,165, Part II, sub. nos. 111,166,000 to 111,744, Part III, sub. nos. 111,745,000 to 112,323, Part IV, sub. nos. 112,324,000 to 113,002, Part V, sub. nos. 113,003,000 to 113,581,160.

Volume 74 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 113,582,000 to 114,161, Part II, sub. nos. 114,162,000 to 114,740, Part III, sub. nos. 114,741,000 to 115,319, Part IV, sub. nos. 115,320,000 to 116,008, Part V, sub. nos. 116,009,000 to 116,587,160.

Volume 75 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 116,588,000 to 117,167, Part II, sub. nos. 117,168,000 to 117,746, Part III, sub. nos. 117,747,000 to 118,325, Part IV, sub. nos. 118,326,000 to 119,004, Part V, sub. nos. 119,005,000 to 119,583,160.

Volume 76 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 119,584,000 to 120,163, Part II, sub. nos. 120,164,000 to 120,742, Part III, sub. nos. 120,743,000 to 121,321, Part IV, sub. nos. 121,322,000 to 122,000, Part V, sub. nos. 122,001,000 to 122,579,160.

Volume 77 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 122,580,000 to 123,159, Part II, sub. nos. 123,160,000 to 123,738, Part III, sub. nos. 123,739,000 to 124,317, Part IV, sub. nos. 124,318,000 to 125,006, Part V, sub. nos. 125,007,000 to 125,585,160.

Volume 78 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 125,586,000 to 126,165, Part II, sub. nos. 126,166,000 to 126,744, Part III, sub. nos. 126,745,000 to 127,323, Part IV, sub. nos. 127,324,000 to 128,002, Part V, sub. nos. 128,003,000 to 128,581,160.

Volume 79 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 128,582,000 to 129,161, Part II, sub. nos. 129,162,000 to 129,740, Part III, sub. nos. 129,741,000 to 130,319, Part IV, sub. nos. 130,320,000 to 131,008, Part V, sub. nos. 131,009,000 to 131,587,160.

Volume 80 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 131,588,000 to 132,167, Part II, sub. nos. 132,168,000 to 132,746, Part III, sub. nos. 132,747,000 to 133,325, Part IV, sub. nos. 133,326,000 to 134,004, Part V, sub. nos. 134,005,000 to 134,583,160.

Volume 81 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 134,584,000 to 135,163, Part II, sub. nos. 135,164,000 to 135,742, Part III, sub. nos. 135,743,000 to 136,321, Part IV, sub. nos. 136,322,000 to 137,000, Part V, sub. nos. 137,001,000 to 137,579,160.

Volume 82 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 137,580,000 to 138,159, Part II, sub. nos. 138,160,000 to 138,738, Part III, sub. nos. 138,739,000 to 139,317, Part IV, sub. nos. 139,318,000 to 140,006, Part V, sub. nos. 140,007,000 to 140,585,160.

Volume 83 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 140,586,000 to 141,165, Part II, sub. nos. 141,166,000 to 141,744, Part III, sub. nos. 141,745,000 to 142,323, Part IV, sub. nos. 142,324,000 to 143,002, Part V, sub. nos. 143,003,000 to 143,581,160.

Volume 84 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 143,582,000 to 144,161, Part II, sub. nos. 144,162,000 to 144,740, Part III, sub. nos. 144,741,000 to 145,319, Part IV, sub. nos. 145,320,000 to 146,008, Part V, sub. nos. 146,009,000 to 146,587,160.

Volume 85 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 146,588,000 to 147,167, Part II, sub. nos. 147,168,000 to 147,746, Part III, sub. nos. 147,747,000 to 148,325, Part IV, sub. nos. 148,326,000 to 149,004, Part V, sub. nos. 149,005,000 to 149,583,160.

Volume 86 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 149,584,000 to 150,163, Part II, sub. nos. 150,164,000 to 150,742, Part III, sub. nos. 150,743,000 to 151,321, Part IV, sub. nos. 151,322,000 to 152,000, Part V, sub. nos. 152,001,000 to 152,579,160.

Volume 87 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 152,580,000 to 153,159, Part II, sub. nos. 153,160,000 to 153,738, Part III, sub. nos. 153,739,000 to 154,317, Part IV, sub. nos. 154,318,000 to 155,006, Part V, sub. nos. 155,007,000 to 155,585,160.

Volume 88 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 155,586,000 to 156,165, Part II, sub. nos. 156,166,000 to 156,744, Part III, sub. nos. 156,745,000 to 157,323, Part IV, sub. nos. 157,324,000 to 158,002, Part V, sub. nos. 158,003,000 to 158,581,160.

Volume 89 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 158,582,000 to 159,161, Part II, sub. nos. 159,162,000 to 159,740, Part III, sub. nos. 159,741,000 to 160,319, Part IV, sub. nos. 160,320,000 to 161,008, Part V, sub. nos. 161,009,000 to 161,587,160.

Volume 90 (Foreign patent statistics) by F. V. Bink, L. K. Libesman and R. F. Smith, Part I, sub. nos. 161,584,000 to 162,163, Part II, sub. nos. 162,164,000 to 162,742, Part III, sub. nos. 162,743,000 to 163,321, Part IV, sub. nos. 163,322,000 to 164,000, Part V, sub. nos. 164,001,000 to 164,579,160.

NEW TANKERS GIVE JET

Boeing and Lockheed Receive Awards in Air Force Tanker Competition

Intercontinental range for high-speed jet bombers and fighters will be assured by new jet-powered tanker-transports, the result of a major industry-wide competition.

These tanker-transports are Boeing Airplane Company's KC-135, which has been ordered into production, and a new Lockheed Aircraft Corporation tanker on which design and development engineering has been authorized. The Boeing

tanker-transport was designed around four Pratt & Whitney Aircraft J-57 turbojet engines.

With efficient, high-thrust engines, these modern tanker-transports will be able to deliver tremendous fuel loads to big jet bombers and fighters flying at combat speeds and altitudes. They will be practical—and essential—additions to America's air strength, giving global "reach" to her combat aircraft wherever they must fly.



GLOBAL "REACH" for jet bombers like Boeing B-52s and B-47s, and for long-range escort fighters such as McDonnell's F-4H, will be assured by a new generation of tanker-transports. The first will be Boeing's KC-135, winner of a major industry competition. It will be powered by Pratt & Whitney Aircraft turbojet engines.



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BOMBERS GLOBAL "REACH"



NEW JET TANKERS ordered into production are Boeing KC-135s. They will be similar in appearance to this one and modern tanker-transport prototype, the Boeing 797. Four advanced Pratt & Whitney Aircraft J-57s, shown at right, will power them. Refueling tanks can be lowered quickly when the aircraft are needed for other cargo missions. Production and operation of the new aircraft will be of major significance throughout American aviation.



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Many engineers complain that the shortage of trained manpower is more apparent than real, and that efficient use of engineers in the jobs they are fitted for could very well be the "shortage".

Industry observes point out, however, that use of manpower is not a problem that can be set up on a static scale, with everybody accepting the resulting solution as the answer. Those is known to be a measure of inefficiency in its use.

Within the context of this series, they see suggestions such as those made by Muller as leading to improvement of the situation.

Alcoa Develops Alloys To Take High Heats

A new aluminum alloy with "unusual properties" at the 500-600°F temperature range has been developed by Alcoa Company of America.

The company also reports that it is developing another aluminum alloy for the 300-400°F range, for structural use on aerospace aircraft. Skin friction encountered at speeds of over 1,000 mph generates intense heat that compromises strength of existing aluminum alloys. Alcoa is working on this for aircraft in aircraft design.

Alloys 500-600°F, developed X2219-T6, are now available in engine casings, quenched and the T6 condition produced by a solution heat treatment and water quench followed by an artificial aging treatment. The company suggests that for jet and piston engine structural applications and insulation parts that are located close to the engines.

Some of the mechanical properties of X2219-T6 (property of Alcoa 2388 T6), a standard forging alloy, are as follows:

- Tensile strength—1,800 lb. at 500°F, 25,000 psi. (1,000), at 600°F, 15,000 psi. (6,000)
- Yield strength—900°F, 7,000 psi (5,000 psi) at 600°F, 14,000 psi (1,300)
- Elongation, 240°F, 24% (50%), at 600°F, 25% (55%).

Also the quote that summarizes these guaranteed minimum figures for X2219-T6's more temperature properties: Tensile strength, 15,000 psi, yield strength, 10,000 psi, elongation in 4D, 6%.



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Mid-Altitude air conditioners, developed for aircraft, trailers, also applicable to fixed installations. Klim & Watt Products Inc., P.O. Box 35, Gencorene St, Okla. **Valve Technical Data** covers standards and ratings. Public Relations Division, Cooper Alloy Corp., Hiltzdale, N.J. **Concurrent IR**, a exciting process using accurate stated to give surface variations of 125 micro-

inches maximum and 0.001-0.005-in. tolerance. John H. Boyd, general sales manager, Johnson Steel Foundry, 63 Limestone St., Lebanon, Pa.

High-velocity spray technique for cleaning precision parts such as low-torque instrument bearings. Clevite, Inc., 1640 Pacific Ave., Caldwell, N.J. **Over 1,000 sizes** of drawn metal boxes for use at case and housing for prototype electronic and similar equipment. 1955 catalog, Zenith Manufacturing Co., P.O. Box 6000, Redwood, Calif. **Stationary Intensive Booster PVA**, Alkaline Scale Products Co., Inc., 322 Stewart Ave., Garden City, L.I. 1.

Facilities for maintenance precision saw machine products, Ingersoll, Worcester, Mass., General Office, Longmeadow, Mass., Church Bros., Worcester, Mass. **Kalorite** carbide hole forming bars for diameters of 0.3 in. and up. Paine & Watson Division, Nykroster Prod. Co., W. Hartford, Conn. **Thermocouple assemblies** and packing glands. Catalog 1542, Clegg Corp., 2811 Shandor Drive, Buffalo 21, N.Y.

Free box for SR-4 strain gages, instructions, and a free literature catalog. Pyle, 1200 N. Highland, Cincinnati 12, Ohio. Catalog 42, Pyle. **Industrial electrical standard** and special plugs and receptacles, Bulova 859, 100 Manufacturing Co., 8135 Clayton Ave., St. Louis 16, Mo. **Stainless MG-83 ballute**, gives design details and application as lightweight X-ray units for laboratory and industrial use. Sperry Gyroscope employs X-Ray for Development Pur-



Hi-Per DC-3 Overcomes Altitude Factor

Here is the American-Gerry Airways 16-Per DC-3 (Aviation Week Nov. 3, 1944, p. 78), at La Fai, Bolivia, flying in the world's highest commercial airport (altitude 13,000 ft). The modernized version of the DC-3 can make approximately 30 mph faster than a standard version because DC-3 PAW R1000 powerplants replace PAW R100s. This modernization and others also give for plane better climb, climb, high altitude and engine output performance. Advantages are particularly desirable when operating from fields located at high altitudes, such as that at La Fai.



THE WHOLE ROHR STORY IS IN MILLIONS OF PARTS!

ROHR has won fame for becoming the world's largest producer of ready-to-install power packages for airplanes... like the Lockheed Constellation, Douglas DC-7, the all-jet Boeing B-52 and other great military and commercial planes. But there's far more to the ROHR story!

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over 30,000 other different parts for aircraft of all kinds.

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CHULA VISTA AND RIVERSIDE, CALIFORNIA

base a new history. Ruth Ballouar
available from Research & Control In-
struments Division, North American
Phelps Dodge Co., Inc., 750 S. Fulton Ave.,
Mt. Vernon, N.Y.

Brassings, nuts, bolts, cap screws and
other types of fasteners, case histories of
use, Form 5208 A, Taggart Rand Co.,
111 Broadway, New York 4 N.Y.

Opportunities Through Automation,
particularly for small plants. In Cell O
Corp., Detroit 12, Mich., 36 pages
now available cover complete line of
sheet and plate working machinery. E. G.
Kuhns, American Pulver Co., Inc.,
4411 41st St., Ferguson St., Kansas City
65, Mo.

2455 N. Sheffield Ave., Chicago 14,
Ill. American Precision Casting
Incorporated describes techniques developed
for lost wax method. Advertising
Dept., Crucible Steel Co. of America,
P.O. Box 58, Pittsburgh 26, Pa.

50-Kilowatt Silicon plant stated capable
of taking 16,000 kw and weather or
time as described in folder, C. H.
Dragon Co., Inc., 3518 Clark Hill Rd.,
P.O. Box 50524, Dallas, Tex. Complete
scientific research and development
studies of flow are described in bro-
chure. Technical Laboratories, Inc.,
4181 41st St., Ferguson St., Kansas City
65, Mo.

Publications Received

• The Army Air Forces in World War II
Men and Planes Volume VI—Edited by
M. F. Clegg and J. L. Clark—Published by Uni-
versity of Minnesota Press, 1949 \$10.00. An
Army Air Forces history, not yet completed
with account of the Army Air Forces in the
Zone of the Interior the volume provides
a record of development of an effective air
opposition, training and destruction of
weapons and equipment and training

• Flight Handbook, Eighth Edition—Edited
by W. L. S. Hart—Published by the U.S. Army
Flight Laboratory, Inc., 15 East 51st St., New
York 16, N.Y. \$6.00, 252 pp. New ed.
with revisions and enlarged pictures basic
information on airplanes, engines and air
manned aviation subjects

• Wave Diagrams for Nonstationary Flow in
Ducts—Edited by W. L. S. Hart—Published by
Van Nostrand Co., Inc., 350 Madison Ave.,
New York, N.Y. \$6.00, 278 pp. Contains
numerous procedures covering problems of nonstationary flow recorded by fully
data illustrated examples and worked-out
with diagrams.

• The Chemical Industry Facts Book, for
1947—Published by Standard Oil Chemical
Co., Inc., 600 Madison Ave., New York,
N.Y. \$1.00, 6,000 pp. Contains available on bulk
quantities 160 pp. Basic reference source
on the chemical industry and its activities

• U. S. Marine Corps Operations in Korea
1950-1951—Edited by Lt. General
John C. English—Published by U. S. Marine
Corps—Pub. by U. S. Government Printing Office,
Washington 25, D. C. \$1.00, 771 pp.
First of four volumes on Marine participa-
tion in the Korean conflict.

• Standard's Materials & Resources: A New
Survey—Edited by Standard's Research and An-
alytics Dept., by Standard's Company Fund
Inc., 310 West 42nd St., New York 18,
N.Y. \$10.00, 1,149 pp. Reference source
on past achievements, present status and
future possibilities of the American eco-
nomy and its resources. It is a reworking of the
original work published in 1947.

• Gas Turbine Series, Vol. 1—Design and
Performance Estimates—by James B. Dugay—
Published by Standard Fund Inc., 121 East
32nd St., New York 18, N.Y. \$9.00, 329
pp. A design manual to present a com-
plete, balanced, up-to-date treatment of theory
and practice concerning the gas turbine.

• Gas Turbines for Aircraft—by F. E. Dugay
and Otto R. Lautenslager—published by Stan-
dard Fund Inc., 121 East 32nd St., New York
18, N.Y. \$10.00, 149 pp. Reference
book for basic knowledge and skills design
and performance of aircraft gas turbines.

• 1954 Supplement to the Metal Casting
Bibliography—Edited by J. C. Harbeck—pub-
lished by the American Society for
Testing Materials, 1916 Race St., Philadelphia
3, Pa. \$1.50, 49 pp. There are 227
new references in this booklet which brings
up-to-date coverage of the published data
since the previous listing.

• Plastic Handbook—by Michael W. Balow-
Pohl and Howard Bell, Standard Publishing
Corp., 450 Park Ave., New York 22
N.Y. \$1.50, 125 pp. Report on the main
and methods used and the major applica-
tions of plastics technology



Crash Program

All Beechcrafts are built to Beechcraft's own standards of safety. These standards are higher than those required by the U.S. Government.

This long-established Beechcraft policy protects air-planes with the "Plan Factor" that means extra safety for their occupants, long life, and freedom from expensive repair bills.

In the case of the Beechcraft T-34 basic trainer for the U.S. Navy, the specifications required a high degree of landing gear ruggedness, to be proved by

repeatedly dropping the airplane onto its wheels from a considerable height, at full gross weight.

Progressively more severe drops were made until the Navy requirement was met, and passed. Higher drops of the airplane continued without significant damage. The above photograph shows the 186th drop test which successfully imposed loads 74% greater than the Navy specification, and without significant failure. That is another demonstration of the "Plan Factor" possessed by Beechcrafts and rendered to their owners, as better service and decreased cost of upkeep.



The Beechcraft T-34 is now in production for the U.S. Navy.
U.S. Air Force, and the civil
aircraft markets of Canada, Ohio,
California, El Salvador, Japan

Beechcraft

Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

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Hydraulic Complete filters, or elements
with Up to 14,000 mesh blend, to 120 gpm
and flow rates down to 16 micron. Efficiency
to 99.95% (AM21720-A, 6, 12, 15; AM2322-1A, 24,
3A; AM2324-1, 2, 3, 5, 10).



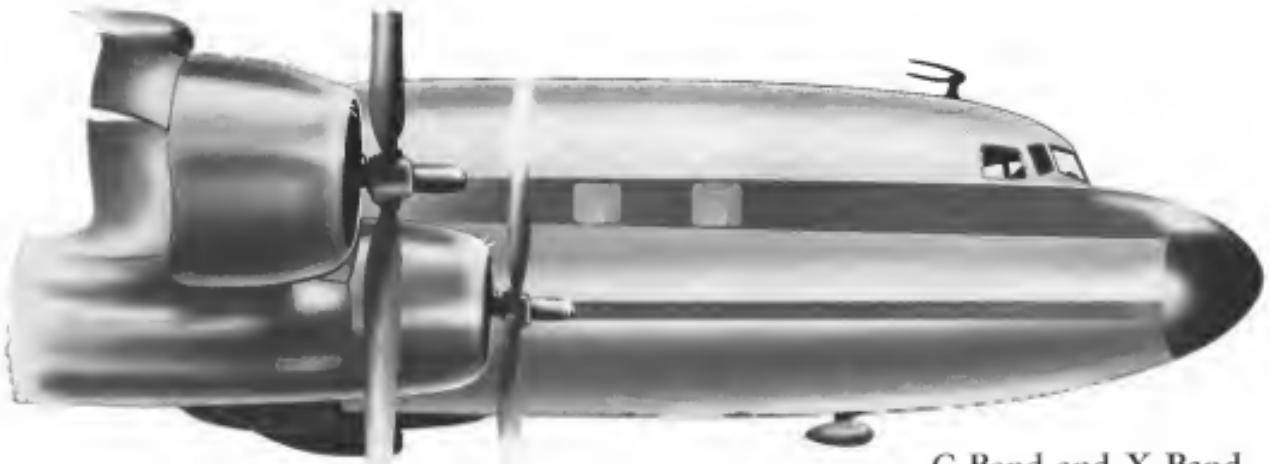
Fuel Flow from 3 PPH to 30,000 PPH.
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pressure. Complete range of filters from
1/2 micron to 200-mesh screen (74 micron).



Air Instrument air and breather filter application
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In airborne radar systems, Bendix[®] is the only manufacturer that offers a choice of the two frequencies in the standard weather radar bands.

Both have been tested and proved.

The selection of frequency depends on the operational requirements of the user and the nose configuration of the aircraft. One is the 3.2 centimeter, 9,300 megacycle X-band. The other is the 5.8 centimeter, 5,400 megacycle C-band.

Either one of these two Bendix made systems provides the transport-type aircraft with a dependable means of avoiding storms in flight. Both bands can "see" storms as far as 150 miles away... through fog, the night or intervening clouds. The position, intensity and extent of the storm cells are shown on the radar screen in the cockpit. From this picture the decision can be made to go around the storm, or fly through it safely, considerably guided by radar along the smooth corridor in the hurricane.

Bendix Airborne Radar makes a major contribution to improved flight safety. But in addition it helps to reduce aircraft damage so often caused by severe air disturbance or turbulence.

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PRODUCTION

Casting Gives Way To Sheet Metal In Some Aircraft Applications

By George L. Christian

Dave Paul, N. Y.—A program to save weight of aircraft components by substituting sheet metal parts for castings wherever possible is being spearheaded by Skilton Products Inc., Long Island City, which is USAF's overall weight reduction effort.

Skilton technicians are specialists in manufacturing precision sheet metal fixtures equivalent with castings in sheet welding techniques. Thus, all fixtures are "knocked out."

First Skilton venture in the area is substituting "tin" for a casting in a valve for an suspended propeller air conditioning system. William Jiang, company president, told Aviation Week that by substituting a sheet metal casting out of Type 307 stainless steel (tough and long lasting) welded instead of cast, cut it out of aluminum since 11.8 lb, cutting weight from 3.8 lb to 2.7 lb.

Tin readily bends, resists fire, using stainless steel.

• **Reduction rate** is appreciable, reduced. Romeo, Skilton says, so that the reduction cannot arise where a machining operation—such as reaming is performed on a casting—means a metal fillet, or the machining job itself is incorrectly done, resulting in scrapping the whole part.

• **Best resistance** of sheet metal is much higher than that of aluminum.

• **Cost of stainless steel vs. casting** is directly comparable, according to company officials.

Growing Trend

According to Jiang, substitution of sheet for casting is a growing trend which will soon spread to other aircraft components where such changes over is feasible.

Another trend at Skilton towards producing lighter, more sensible aircraft equipment is the use of a thin aluminum casting containing plastic sandwich material to form light, yet strong, aircraft components.

Jiang cites these two examples where such construction proved to be superior to previously used methods.

• **Parabolic Cancer case** as 500-square-inch plates made of 0.015 in. thick aluminum slab. Skilton turned out an assembled plate made of two 1/16-in. sheets of aluminum, sandwiching a piece of Lockheed, to give the assembly the same 1/4 in. total thickness.

• **Sheet metal containers**.

One of the Skilton firm's specialties is sheet welding. Metal. This trick is particularly applicable and can reduce weight and in fabricate tanks of all kinds—such as for aircraft, and fuel tanks for boats in the China Coast to provide weight savings.

One of these tanks is the China Coast's 100-ton weight and metal is used, Jiang says. Sheet welding gets the job done at the lowest possible cost, which using Almond results provides a tremendous weight reduction.

Jiang says he has developed sheet welding techniques of his own which seem to work unusually large in sheet structures with ease, resulting in unusually low costs.

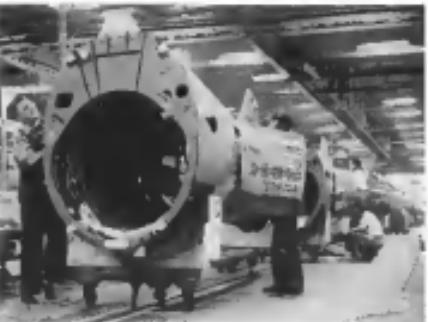
Jiang is also experimenting with a stainless steel fuel tank for the Pogo C-45 to replace the standard steel tank currently used.

Improvization

Skilton plants that are lacking in large financial resources often have to find their own ingenuity ways of getting things done to avoid large unconsolidated costs.

For example, a company in New Jersey has a problem of how Skilton can produce a good-size deep housing at a fraction of the cost of buying such a machine.

Jiang says he will adopt this makeshift technique to the manufacture of other commission items, such as bolt and



Assembly Conveyor Speeds F-84F Production

The larger version for USAF's Republic F-84F Thunderjet, produced in Team 4A, can cast underfoot more than the assembly line at a top speed of eight feet per hour on the Delta conveyor a drag chain conveyor. Team 4B expects its new 500-foot conveyor to simplify and speed production of the fighter bomber's side. Each overhauled assembly is moved by a three-quarter horsepower electric motor, the gear ratio on one of Team 4B's production fixtures is 50:8000/turns and 30,000/turns on the second belt.

The SPIRIT of ST. LOUIS CARRIES ON

F-101 Voodoo
The World's Most
Powerful Fighter



VISION—

the inherent quality of aircraft engineer-
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photo of early St. Louis aviation
pioneers—continues to produce fighters

aircraft for the Armed Forces. Designed and
developed by McDonnell engineers and technicians,

the F-101 Voodoo is another outstanding milestone in the
history of St. Louis aerospace achievements. This supersonic,
long-range twin jet fighter is capable of flight refueling and carrying

out atomic strikes.

Under the leadership which freed many early pioneers of aviation, McDonnell is
making available to its engineers the most advanced facilities for engineering development
—propulsion laboratories, wind tunnels, a helicopter test laboratory, a new flight test
barrier, a modern physical testing laboratory and an ever growing technical library—all parts of

M. A. C.'s \$100,000,000 facilities program.

So today, as in the past, the Spirit of St. Louis is symbolic of aviation pioneering. The McDonnell engineering
team is constantly pushing the envelope—reaching for design perfection—greater speed, longer range and versatility.
Watch for these characteristics in future M. A. C. products.

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Graduate engineer with sufficient flight experience to qualify as a test pilot. Duties include: flight test of new aircraft at the time of maximum economic flight performance; development of new aircraft; development of flight test programs; evaluation of flight test data; and preparation of reports. Minimum of 2,000 hours flying time; current flight rating; basic aeronautical training; 1000 hours instrument rating; ATPL; primary wings & jet rating desirable.

**FLIGHT TEST
ENGINEER**

For experienced flight research engineer, responsible for the development of aircraft performance, reliability, and maintainability. Duties include: flight test of aircraft and flight control equipment. Must be familiar with all aspects of aircraft design and aerodynamics, aircraft performance, and flight dynamics. Minimum of 2,000 hours flying time; current flight rating; ATPL; primary wings & jet rating desirable.

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ENGINEER**

Responsible minimum 5 years aircraft structural design and stress analysis, aircraft maintenance, and aircraft repair. Must be familiar with the mechanical behavior of aircraft airframe components.

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ATT: Robert Street
PHONE FOR APPOINTMENT
Baltimore 9-8068**

**SPERRY
GYROSCOPE COMPANY**
Division of the Sperry Corp.
P. O. Box 238
ROHDESDORF, L. I., N. Y.

F-54P. The job required a deep knowledge capable of bending a 50-ft, 21-in. tube. The Jung did not have a deep knowledge, but he thought he could teleconfer. The job took 10 days of investigation. The results of the investigation showed that he could not. So he bought two gauge-type sets to double-check and set them in right sight of concrete in his new plant here.

Hydraulic action was too slow for deep bumper operation so the two sets were converted to pneumatic action.

The metal bar was attached to so much concrete the two jacks. The female set was placed on an aligning machine, while the male set was inserted in place. The rapid-action 4-ft deep bumper was set by the pneumatic conversion, which was

To separate every bit of metal out of the machine, Jung and his technicians fastened stretch angles to the concrete and so that, with hydraulic operation, it became a stretch press.

Stefan's do-it-yourself enthusiasm also built a tungsten welding chamber out of two, 50-in. dia. community recycling bowls. Used evaporative sauna gloves to allow welder to work within the chamber a week window and an observation window. Chamber is mounted on a ring which permits it to be positioned in any way the operator

desires. It is charged with oxygen because of tungsten's tendency to oxidize during welding.

Among other mission objectives at Skyscan are development of center payoffs for Aviation Airlines, Pan American World Airways and American Oil Co's DC-6s, aircraft and repair and recovering surface materials for the Air Force and Colonial Airlines.

Being in the business on water and land lead carts for PAA and AA. The carts will be fitted with Piper Cobras and standard 6,000-lb wheels, large enough to cope with new and deep rates.

In the sheet metal line, the company is re-manufacturing many parts for a Skyscan water separator and a venturi system. A Skyscan project requires putting his sheet metal expertise up an electronics laboratory, where he attends to design and manufacture electronic assemblies.

In a very preliminary road-up stage is a small convertiplane which will operate on the pelagic principle.

In the marine field, Jung is putting out a wide line of Metal hardware, such as mounting lights and charts, plus the Metal boat fuel tanks.

The Skyscan Products department will be in the division of American



More Bad News for Subs

Four Lockheed P2V-7 maritime Neptunes are shown during completion at Berbank, Calif. New straight-line production system is used to cut the time and cost of moving the jet plane, equipped with paravanes, into the final configuration. To the right of the aircraft, a fuel line (not yet shown at the picture) is fed directly into the Neptune's intake transition for radio-equipped Super Const. Considered four distinctions for space parts (bottom, right) also helps save production costs. Building number 800-7088.



RESISTOFLEX

CORPORATION
Bellefonte, N. J.
West Coast Plant, Berbank, Calif.

...rated at 500°F!

*Another advance in lightweight
flexible hose assemblies*

Constant hose development work at Resistoflex has paid off again. Service experience has permitted an improvement in temperature rating of Fluoroflex™-T R-300 hose... the first aircraft hose to use "Teflon"™... the first to warrant a 500°F rating at 1000 psi (750 psi at the larger sizes).

Made with Fluoroflex-T (Teflon-compound) tube, SAE 304 stainless steel reinforcing braid and blowout-proof compression fittings, the lines offer permanent plumbing... no swelling, no erosion, no aging. Their flexibility stays the same throughout the temperature range. Fluoroflex™ R-3800 hose assemblies are A-N approved for use with synthetic oils, fuels, and furnishing oil.

Bulletin FTS-2 gives detailed data... send for your copy to RESISTOFLEX Corporation, Bellevue 9, N. J.

A Fluoroflex is a Resistoflex registered trade mark for products from DuPont. DuPont is the DuPont registered trade mark for tetrafluoroethylene products.

can Export Aviation Corp. and three other employees moved into 100,000 sq. ft. space in Interplex near La Cieula, and launched the new venture with \$500,000 cash. That was seven years ago.

Today, at Deer Park, a new 15,000 sq. ft. addition to a two-level, 31,000 sq. ft. plant is nearing completion.

Explosives plant is just under 100,000 sq. ft. addition to a two-level, 31,000 sq. ft. plant is nearing completion.

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Continental Aviation & Engineering Corp. expects to have some 300 employees working on 140 aircrafts, both military and civilian, from Teterboro, by year's end in USAF-owned facilities at Toledo.

Aerospace Corp., Joliet, Ill., has purchased a recently completed 10,000 sq. ft. plant in Toronto, for its new Canadian subsidiary.

General Aircraft Co., Wichita, has received a \$5-million contract for 25-400 tonnelet stabilizers from Republic Aviation Corp.

W. C. Truett Industries, Inc., Bryan, Tex., maker of jet engine components, is adding approximately 23,000 sq. ft. to production facilities.

Photo process parts manufacturer in valves, thrust chambers and other parts



VACUUM CORRECTS DENTS

to expand smooth contours, using portable equipment derived from Glass L. Morris Co., Buffalo, N.Y. Here a vacuum bell tank undergoes reworking. A plate, riveted to the tank's bottom, is placed over the dent and sealed with a sponge rubber gasket. Vacuum is applied by two air pumps. Compare to what was done before and after repair on surfaces not corrected by this method.

Photo by AEROFIT CORP. Corp., Atlanta, Ga., discusses need to move plants to parts.

Assembly Projects, Inc., Champaign, Ill., maker of nuclear relay, plans to have a new subsidiary, Assembly Projects of Colorado, producing near Desert Hot Springs this summer.

Amico Industrial Co., Chicago, Ill., maker of rad and aeron standards and machine shop tools, has announced a 10,000-sq. ft. expansion to provide increased working area.

Safe Tool Division, Amico Metal, Inc., Milwaukee, Wis., has reorganized Aviation Supply Co. as distributor for its spark-resistant lead tools for

Karen Erb, Mamm and Dugan, Utah Company has named Aegis Corp. as representative in London, N.J., for their store, General Distributing Co., Cedar Falls, Iowa, is the agent for the Aegean Weld line.

Standard Machine Tool Co., Rockford, Ill., started construction of a \$5 million plant near Denver, Colo., to make jet aircraft structural-panel shear assemblies. Plant is expected to begin operation in November.

Genent Corporation of Los Angeles is erecting a six \$2.5-million行政和engineering office building at its Aerospace Manufacturing Division plant adjacent to Los Angeles International Airport.

Aeros, Inc., Woodside, N.Y., maker of phase measurement and control systems, is adding 31,000 sq. ft. to its engineering and administration facility.

USAF Contracts

Following is a list of recent USAF contracts announced by AW&C:

Advanced Warfare & War Co., Wichita, Kans., via subcontractor, signed Aug. 11.

Advanced Technology Co., Cleveland, Ohio, maker of nuclear relay, plans to have a new subsidiary, Assembly Projects of Colorado, producing near Desert Hot Springs this summer.

Amico Corp., Inc., Los Angeles, maker of nuclear relay, plans to have a new subsidiary, Assembly Projects of Colorado, producing near Desert Hot Springs this summer.

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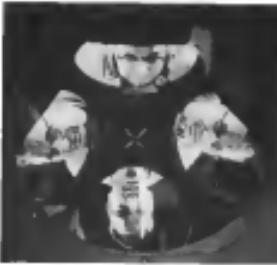
Amico Corp., Inc., Los Angeles, maker of nuclear relay, plans to have a new subsidiary, Assembly Projects of Colorado, producing near Desert Hot Springs this summer.

Photo by AEROFIT CORP. Corp., Atlanta, Ga., discusses need to move plants to parts.

Northrop Does It With Mirrors

Four mirrors, precisely ground and aligned, are the optical heart of a new solar peeling board being built for USAF by Northrop Aircraft's Anderson, Calif. division. The company's interest in solar has led to the start of its Stark peeling model program, because of the advanced optics of techniques used at present compared to conventional systems. Northrop has a complete optical processing center for producing extremely precise glass components.

Photo by AEROFIT CORP. Corp., Atlanta, Ga., discusses need to move plants to parts.



Shown here is a giant step toward tomorrow.

Conceived and developed by a team of Martin people who have been working with Navy aircraft since 1939, Viking II is the latest of a series of high altitude research vehicles.

It was designed to explore the problems of controlled flight in the near-vacuum conditions of the outer atmosphere and at speeds in excess of 1,000 mph.

In this long-range Viking program, technical problems are e continuously being solved which support advancements that are now being made toward the next frontier of flight—rocket-based intercontinental range.

And beyond that lies space itself.

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engines and modification centers—showing
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Detroit 203, Mich., 2001 Grand Ave., Post Office, 2217 Post Office Building, Detroit, 20214 Belpointe Blvd., Cincinnati, Ohio, 45216 Belpointe 4-446.

LETTERS

Engineers on Shortage

The letter from W. H. Moore and his references in the "Engineers Shortage" (AW, 1-19-61) are appropriate. We also have been concerned with the claim of winter closing shortage of engineering manpower all over the world and we are sure of the reason.

Every nation of the free democratic world has plausible reasons to protect its engineering manpower. Not only are they in the armed forces, but also to maintain its industry, its electrical and engineering facilities.

Problem in Selection

The truth is that in America there is not a shortage of engineers, either it could be said that there are enough to supply all industries if selected and employed correctly.

A lot of graduate engineers of American colleges cannot find jobs at all and the others, if they find work, find it out of their specialization.

In the selection to cover demands, states that these engineers have not had enough experience. This means that there is no real selection of engineers, but only of capable individuals to grade and train them engineers.

Admitting that there is a shortage of engineers, what are the industries doing to alleviate the shortage? Nothing! Only a lot of shams and words which mean nothing and a cup of hot water to solve the problem.

Everybody calls for the "open" but nobody thinks and proposes the necessary actions against it. Then, why all these articles with warnings to the public? What is the purpose of this article, if nothing else at least? Why claim the reasons as the shortage of people in engineering fields when the industries do not require more professionally trained skilled men?

Some proposals are made by the aircraft industry, but not for the purpose to dismiss the engineers half of engineering services and with eight to 10 years or more of experience. Now you can laugh at the shortage.

In the discussion of engineering education, it is the proposal of the college engineers to do the students a full load instead of the engineering loads they choose, but saving the required experience.

If the industries do not wish to train the power engineers, as they wish them, then perhaps they should have alternative industry or government jobs to release the need for the engineers from the engineering power.

It is known that in this country there are many engineering people looking for guidance to lead them into the special racing field desired, then, the industries could do likewise those whom they are needed most.

In addition to the above, in America, in Canada, Australia, there are many engineers with foreign training but lost in America. Most of these people do everything except the work they are specialized in.

If the industries were to give more em-

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Lockheed P2V NEPTUNE

The U. S. Navy's first line of undersea defense—that's the new P2V Neptune multi-mission patrol bomber. Two jets plus turbo-compound engines give extra speed when needed . . . special apparatus spots subs deep under the sea. Its many uses for patrol, for attack, for mopping up all spell "security" for America's coastline.

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Ex-Cel-O-Corp., Detroit 32, Mich.



Fast Stress Calculator

A handheld electronic calculator similar to a circular slide rule has been developed as an aid to the analysis of aircraft structures.

This stress calculator measures stresses along the length. They are based on determination of the reduced cross-sectional area of the structural member while it is under load, rather than on the unstrained full area.

One manual movement of the new calculator gives two stress values opposite to applied loads for a given size and material of the structural member. The calculator is applicable in units with diameters between 0.1 and 0.51 in.

Brechner Services Co., Box 2492, Cleveland 12, Ohio.



Mobile Cargo Conveyor

An cargo conveyor unit mounted on a Ferguson tractor can load 36,000 lb/hr with belt speed of 25 fpm. Designated Model 100, the conveyor unit was designed and built by Beloit Implement Mfg. Co., Ltd. (Clynes Brothers), Melton Mowbray, England. Initial orders for the conveyor were placed by Saudi Aramco. Since it works with an Armett Container

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Dorron Aviation Radio & Equipment Corp., Tico, Ohio.

ALSO ON THE MARKET

Marine sonar depth gauge of 5 and 600 ft. capacity has 0.001 in. vernier. Standard part can be replaced by hardened long straight axis for small craft. Model—Coastal Survey Co., Inc., 210 Reference St., New York 12, N. Y.

Electronic Counter-Orders for Brown & Sharpe automatic machine accurately count parts produced and gives visual and audible alarm when stock is exhausted. — Counter-O-Lane Co., 1271 W. North Ave., Chicago 22, Ill.

Wire-stripping induction generator. The Miner Model 35 WS, perhaps most at naked visual, goes to No. 36 wire on solid or bare lead wire. The unit features heat plate insulation in the stripping area, the maker reports. Device also converts for use in hermetically sealing, soldering or heating. — Johnson Heating Corp., 351 Wright Ave., Brooklyn 11, N. Y.

Solvent removers. Neoprene compounds remove residues in less than two hours, the manufacturer reports, compared with 48 hours for other methods. Other 350 has a high flash point and low toxicity. Case is 54 lb. per lb. in 480 lb. container.—Aerol Chemical Co., Massapequa, N. Y.

One Fuel Gauge Gives Two Displays

Single fuel gauge, fuel quantity in degree gauge has both total and individual tank readings. Selection of total or single-tank gauge is pneumatically controlled by means of a panel switch. Reading of any tank is obtained by actuating the panel switch.

During totalized reading, the pointer automatically divides up total and remainder by means to eliminate ambiguous readings. With the pointer set on the dial at openend, a dial "flag" indicates that a single tank is being read.

Indication is heretically scaled and meets all applicable MILSPECs, the manufacturer states.

Avtron Inc., 38-35 Northern Boulevard, Woodside 77, N. Y.

Transmitter Covers 110-125 Mc.

New VHF transmitter, weighing 1 lb. 6 oz., covers channels from 110 to 125 mc and features a uniform 3 to

High-temperature wire is used. Lead is stated to be less expensive than monel wire and gives better heat shock characteristics. Product is also said to show no tendency to crack.—Schenectady Vacuum Co., 200 Concourse St., Schenectady 1, N. Y.

From Burke develops 12 tons of pressure with a 36-in. length of lead. Ram feature insures control that can be passed and the new plating is reported as more durable than the old.

DeAman Hydralic Power unit has a 60-stroke per minute



America's big jet bombers are meeting all schedules

Boeing B-52 global jet bombers now well into the advanced stages of their flight test program while production airplanes are emerging from the factory on schedule. The airplanes assigned to the continuing test program are averaging nearly twice as many flight hours per month as any previous high-performance aircraft.

This record, in part, is a measure of the success of the B-52 design. It is also a reflection of the huge engineering resources of Boeing's new Flight Test Center—the largest, most complete facility of its kind in the country. The Center enables Boeing to achieve a higher

percentage of productive flight test time than any other company. Boeing 13 years ago developed the world's first jet-powered transport, the Boeing Stratoliner, and the world's first pressurized bomber, the B-29, mighty war weapon of World War II.

Out of the Boeing background grows America's dominant position in the field of pressurized, high-altitude, wide jet aircraft. It is a position held by one of the country's largest pools of aeronautical engineers, by advanced research facilities, and by the Boeing tradition of creating aircraft that open new areas of military and commercial flight.

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production rate on a 4-in. stroke. Price: \$1,195. —O'Neill-Davis Manufacturing Co., 516 Eighth Ave., Lake City, Minn.

Belt grinder and sander, Separated No. 170, after belt speeds exceeding 16,000 fpm, over 1,200-in. belt length in polished versions available at prices from \$245-\$365. —Another Mfg. Co., 229 W. Orange Grove Ave., Burbank, Calif.

Electric soldering table has automatic timer adjustable from six to 94 seconds per minute. Repeat accuracy is stated to be 0.001 in. Table is available in a packaged unit with an electric soldering iron. —Black & Decker, Inc., 449 Whitehouse St., Newton, Mass. 02164.

Adjustable draw key for locking Moog Taper shear bolts in aircraft spindles in one wrench adjustment comes in sizes to fit spindles with spindle diameters from 1 through 5 in. and draw key slot sizes 30 mils through 144 mils. There are no exterior attachments to aircraft spindle—Draws Roring Tool Division, Gedding & Lewis Machine Tool Co., Soult du Lac, Que.

Spur nozzles, check valves provide capacities of one to eight gallons per minute, make repeat spraying. Systems Co., 3281 Randolph St., Bedford, Ill.

Rescue By-Way shoulder extract tools with only 4 in. exposed length without damaging threads and given fully adjustable control over extracting depth, the author says. —E. V. Nichols, Inc., 128 Broad St., Stamford, Conn.

Type B-1 Flite, the after-ally braided of stainless, elastomer heat-resisting of line, chairman and magnet cables. Takes heating to 1,400,000°F for shear base, manufacturer states—Hendy & Henney, 82 Fulton St., New York 18, N.Y.

Highspeed biplane-Snap rotary switches for compass or sidetraction load control can be furnished for any speed to 13,000 rpm. Minimum life is stated to be one million cycles—Taig Magnamed Products, Inc., Biotronite St., Bedford, Ohio.

High-frequency generators for induction and dielectric heating are 15 in. in width. Generators are rated for frequencies to 9,000 cps and various voltages up to 450 kV, up to 50 mc.—New Nordic Tool Corp., 322 Main St., New Rochelle, N.Y.

Aerosol dispensers handle lubricating and penetrating oils, oil stabilizer and all-weather lubricant. Canister contains six ounces—Cross Industrial Products Co., 1812 Amsterdam St., Woodstock, Ill.

R-652 actuates the
tailwheel power steering
installation in the
Hawker Siddeley Canada's
Ottawa OTter

The R-652 hydraulic actuator is 30-inches H
maximum, weighing 16.6 lb. Overall size: 1000 lb. It converts the aircraft's
hydraulic power into mechanical power
to turn the tailwheel. It has three
power levels with 12-volt solenoid actuated.
The R-652 weighs 3.16 lb.



Courtesy of Hawker Siddeley Canada, Ltd.

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Airborne's R-652 rotary actuator supplies the finger-tip taxying control bush pilots need to fly the Otter in and out of unmarked strips in Canada's rugged north. On landing and take-off, the pilot energizes the actuator, which locks the tailwheel in place with the rudder. The R-652, mounted on the tailwheel spindle, has proved as sturdy and reliable in service as the Otter itself.

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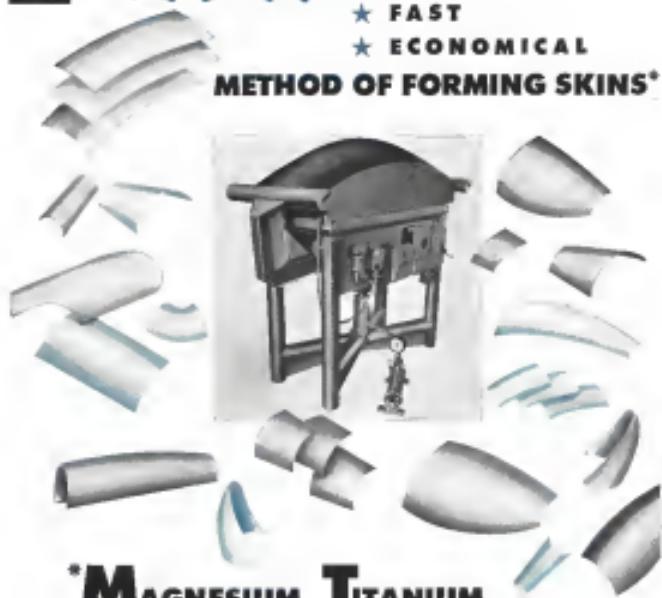


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AVIONICS

Phase Shift Cleans Up ADF 'Confusion'

By Lt. Cmdr. H. B. Ward Jr., USN

The "zone of confusion," long a bane to the development of automatic direction finders, may be eliminated to provide a single-element reversal of the ADF needle over the station, for aircraft altitudes up to several thousand feet.

The conclusion is based on a theoretical investigation of the basic problem, followed by flight tests which confirmed the theoretical findings.

On previous investigations, the new technique can be applied to existing ADFs without internal modifications by inverting a plane shift so the zone reversal angle will vary phase shift angle proportional to the increasing signal frequency, up to a maximum value of about 30 deg. The principle can be demonstrated by defining an ADF receiver slightly.

Explanation

A theoretical investigation into the zone of confusion problem is that the receiver phase shift angle which would ditch these points would be such that the ADF needle will try to reverse. The equation is that of a roughly circular or paraboloid zone below the surface, as shown in Sketch A, above right.

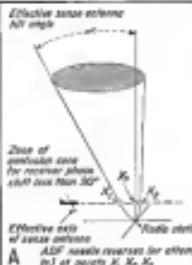
The tilt angle (β) of the control surface is determined by the effective receive zone antenna pattern (θ), a function of its longitudinal location along the plane's fuselage. Other variables in the equation include:

- Phase advance of the ADF loop antenna array by the receiver.
- Wave length of the signal.
- Antennas length and location relative to the vertical axis of the radio station.
- Frequency of the station carrier wave.

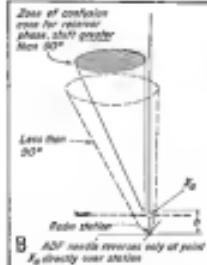
If the receive antenna pattern were truly vertical (tilt angle zero), and if the receive phase shift were exactly 90 deg., there would be no zone of confusion problem. However, both of these are difficult to achieve because of surface and receiver design considerations.

Under conditions when the receiver plane shift is less than 90 deg., there are three positions of the receiver near the station where the ADF needle will try to reverse, as shown in Sketch A. It will try to reverse when the plane first approaches the control surface (X_1), when the plane passes over the antenna (X_2), and when the plane again approaches the control surface (X_3).

The same condition exists even when



SKETCH A Diagrams show how shift of phase angle can end existing ADF needle reversals.



SKETCH B Diagrams show how shift of phase angle can end existing ADF needle reversals.

the same antenna will be vertically under the aircraft (90 deg. angle zero), if receiver phase shift is less than 90 deg. The control surface would be inverted about the station axis, and would also be inverted from that shown in Sketch A.

The direction of the ADF needle would be determined by whether the needle has sufficient time to completely reverse before receiver phase reversal point is passed; this would depend upon the speed of the airplane and the time constants of the ADF loop drive system.

If, instead of less than 90 deg., the phase shift within the ADF receiver is greater than 90 deg., then the control surface effectively is inverted in space above ground, as shown in Sketch B.

An airplane flying below the tip of the control surface completely within two of the zones of reversal, crossing over the control zone (X2) directly over the station.

The angle by which the zone of confusion zone is elevated above ground is determined by:

- The angle of the receiver plane shift.
- Receiver loop antenna plane shift.
- Station carrier frequency.

A graph setting forth the relation ship between the height of zone elevation (β) and receiver phase shift and zone antenna tilt angle is shown on p. 74.

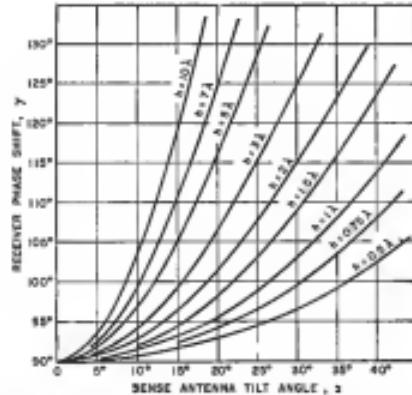
The elevation (β) is shown in terms of radio station center wavelength. Sound graph on p. 74 shows the

Zone Of Confusion

The "zone of confusion" has long bedeviled the automatic direction finder, one of aviation's oldest, yet still widely used, aids.

As the name implies, the radio station to which the ADF is tuned, the listener appears to be confused, not knowing exactly where the plane has passed the station. The ADF needle may first point ahead, then start to turn around. Then it may return to the ahead position, and finally turn around again. When passing another station, the ADF needle may not definitely, but still suddenly, turn. This makes it difficult for the pilot to use the radio station as a position check point.

The author of this article suggests a simple cure which can be applied to existing ADFs or designed into new systems. The cure is the enlargement of an investigation made by the author at Stanford Research Institute during a 10-week Industrial experience test, part of a three-year course at the Naval Postgraduate School in Monterey, Calif. This investigation was supported in part by USAF funds.



ELEVATION OF ZONE OF CONFUSION CONE above ground (λ) in wavelengths of one-half as a function of sense antenna tilt angle (θ) and radio phase shift angle (ϕ)

consisting of "X" lens, feet, short ground.

For reasonable phase shift angles and antenna tilt angles, the spurious receiver noise can be elevated 3,000 to 4,000 ft.

Flight Tests

Having thus predicted what should happen, a series of flight tests were flown in which the variables were eliminated, and the "point forward" or "point off" results of the tests were compared with theoretical Army results. The loop was kept pointed 90 deg to the right by decompressing the loops to the loop drive motor.

The point is that the loop pointed over the station was established by having a ground observer, with a portable radio, located at the station site. The observer sighted up a vertical structure and gave the aircraft a "mark" when it was over the station.

Flight test results agreed extremely well with theoretical predictions. When the phase shift of the receiver was adjusted to a value greater than 90 deg, the 100 ft rise in the zone of confusion cone would lift off the ground, making it possible to fly under the surface.

The predicted a single clear cut result which occurred when the plane passed over the station.

Flight tests also showed that when the plane flew through the "cone of confusion" there was no time when the needle would have been wandering markedly short. Instead, it always went

needle tends to point away from the ground station. At all points outside of the surface, the ADF needle is driven toward the correct bearing.

Anyone can easily verify the validity of this analysis as follows:

* Take in station on ADF and note receiver tuning indicator reading.

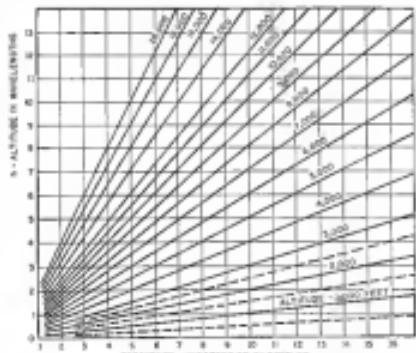
* Decrease the receiver tuning a higher deflection so that the tuning indicator drops back to about 5.0% of the maximum reading previously noted. This provides a maximum phase shift of more than 90 deg.

* Tie the airplane at or above an altitude equal to 2,000,000 divided by the frequency of the station in kilocycles (ft). For example, if the radio station broadcasts at 500 kc, tie toward the station at 2,000 ft altitude or less (1,000,000/500). Only one ADF system should take place, and that when the plane passes directly over the station.

If the receiver is now rotated to the maximum reading (100 deg), and then moved toward a lower altitude, and the receiver reads about 65% of the maximum reading, the maximum phase shift will be less than 90 deg, and the ADF will behave in its normal intended manner.

The analysis predicted that the investigation should show that it should be possible to produce single ADF receivers over any station in the range of 100 to 1,750 kc, located below an altitude of 3,000 to 4,000 ft, providing the tilt angle of the sense antenna is not excessive.

Manual decompressing of the receiver can



THIS CONVERSION CHART RELATES absolute (λ) of zone of confusion in wavelengths to feet as a function of the carrier frequency in kilocycles.

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be used to introduce the required sense antenna phase shift, but this coupled with ADIF tuning procedures and it reduces the possibility of harmonic tone in the output.

The same result could be achieved by introducing a phase shifter in the sense antenna input, which would then a negative phase shift whose angle is approximately proportional to index and frequency, up to a maximum of 30 deg.

This has a disadvantage for long-distance ADIF operation because the torque developed to turn the ADIF loss decreases with phase shift (Item 59).

Conflicting Requirements

This points up a basic conflict in ADIF requirements for low loss and short time operation. Close to the station it would be possible to have a small sense antenna tilt angle, a higher-speed loop drive motor, and a phase shift of more than 90 deg. in the receiver.

For long range use, however, the ADIF needs a short sense antenna cable run to reduce losses, a longer loop motor to reduce inductance in damping out static interference, and a phase shift of approximately 30 deg.

The solution now is a dual speed motor and the use of two separate sense antennas. At longer ranges, the sense antenna loss is not the main problem, but it would be reduced without phase shift, and with the slow motor speed fast time to work, the ADIF would be switched to a small sense antenna, the motor speed would be three times faster, and the finished phase shift would be increased beyond 90 deg., and motor speed would be three times greater.

Switching might be accomplished manually by the pilot or automatically, according to received transponder signal strength.

New Subminiature Devices on Market

A new subminiature relay, reportedly the smallest yet developed with an open coil of 2 turns, is one of several recently announced radiotele-

communications components of interest to designers.

The new General Electric relay, hermetically sealed, is fully switchable between 500-5000 ohms and 700-1000 ohms between 35 and 500 cps.

Model CR-2591C100, measuring 0.81 in. high, carries an shielded coil resistance of 500 ohms for 250v dc operation, or with coils up to 4,500 ohms.

GRB's Model CR-2591C110, measuring 1.12 in. high, is a current-sensitive model with maximum coil resistance of 9,600 ohms and a pickup current of 7.7 mA.

Other new subminiature components include:

• Circular passageway for printed circuit boards. Remceptek, Ft. B 3546, offers over 100 types, with terminals for crimping and dip soldering on printed



boards. Associated crimp plug is B 3540, and resistance is the ≤ 1 m ohm long.

Manufacturer: H. H. Bagge, Inc., 518 Jefferson Ave., Toledo 6, Ohio.

• Ceramic rotary switch. Sico M, occupies a panel area of less than 13



sq. in. and displays contact ratings with over 1000 contacts. Single-pole style has 10 ohm rating type contacts and is available in many combinations including multi-disk, star, etc.

Two or three poles per disk also are available. Contact capacity is 2 amp., with flash-over voltage of 1,000 v. at 50 cps.

Manufacturer: The Hayes Co., Dept. 52, 391 Central Ave., Newark, N.J.

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Tiny Switch Is Less Than 1 In. Long

A tiny rotary selector switch, only $\frac{1}{8}$ in. in diameter x 4 in. long, was recently put in the market.

The new series 301 selector switches are available in single-pole/12-position, two-pole/12-position, three-pole/12-position, and five-pole/12-position models, with standard 3-in. shaft and 4-in. bushing. Contact rating of contacts is 10 mils at 300 v ac or dc, 500 ma at 100 vdc.

The manufacturer of the switches is Schenck Mfg. Co., Inc., Down, N.H.

Other new miniaturized components include:

- High-temperature power transformer can be operated at 400 to 6,000 rpm, from -55°C to 135°C , with up to 95% efficiency, according to manufacturer. Transformer occupies only 1.65 cu in., comes in hermetically sealed plastic type case.

Manufacturer: Communications Accessories Co., Belmont, Mass., Mass.

- Interference Elim. new series of small logic isolation logic units, are suitable in ranges of 0.1 to 125 mils, 125 v dc with 1000 switchings and 1000000000 gate operations. Milli-second speed can be obtained at -55°C to 135°C , and come in hermetically sealed cases that have solder terminals.

For engineering data, write to Technical Literature Section, Sprague Electric Co., 127 Marshall St., North Adams, Mass.

- Toggle switches, rated for 10 amp at 50 v d.c., 50 SPDT and DPDT models, reportedly are half the size and weight of these predecessors.

SPDT unit weighs 0.15 oz., measures



Small Actuator

New linear actuator that weighs only 1.4 lb has been made 21% smaller than its predecessor by integrating motor and reduction gearing. Speed of the new Type ACT-5000 can be changed from 0.6 to 30 in./sec. in increments conveniently by interchanging only two gears. Unit has built-in slip clutch and limit overtravel and is designed for use in high ambient temperatures according to manufacturer. John Dyer Manufacturing Co., Arkansas Division, 1 Main St., Eureka, Mo.

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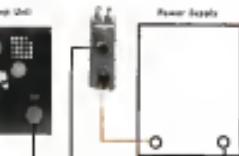
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FINANCIAL



Aircraft Industry and Investors Find Convertible Bonds Attractive

Convertible bonds today enjoy wide investment popularity and to a great extent have replaced the offering of common stock in the industrial field. Now, the security holders, having imposed their restrictions and speculative sweepstakes, may find it advantageous to use this vehicle for their financial purposes.

The upcoming sale of \$30 million in convertible debentures by Lockheed Aircraft Corp. not only highlights the demand for additional capital by the aircraft industry, but the popular nature of these "buy-away" securities, as well.

Earlier this year, in April, General Dynamics Corp. successfully raised a \$10-million issue of 34% convertible debentures.

At recent annual shareholders' meetings, both the Glass L. Morris Co. and United Assess Corp. sought and obtained approval to increase the number of their authorized shares to be available for issuance. Whether convertible debentures will be used is not yet decided.

Why Comorbidity?

What are the features of this type of financing that make it attractive to industry and investors alike?

The issuing company benefits in that interest paid is regarded as an operating expense for income tax purposes. With the corporate tax currently at 32%, management can, in effect, save half their interest cost as compared with dividend payments as the cost

new stock.

Although interest on borrowed capital, such as that available from debt-bearers, is not an allowable cost in the pricing process on government contracts, the cost of capital to a company is generally lower through the contract debt-bearer route than through direct stock financing.

In effect, issuance of convertible debt frequently is nothing more than a delayed option issuance of new common stock. The conversion does not take place until the market value of the common stock reaches the usually higher price designated by the conversion contract.

is accomplished by setting the price for conversion into common stock at a point above the market price at the time of the sale.

The purchaser is also generally required with a convertible debt issue. While the convertible bond carries little or no premium for the conversion feature, the market price tends to reflect money rates in the corporate bond market. It is very seldom the convertible feature becomes of value if the market price of the bond reflects changes in the money market.

In other words, there is a floor under, but no ceiling over, conceivable bond prices. This affects derivative price predictions. As the market price of the contract rises to exceed the equilibrium price of the bond, both buyer

While obtaining an interest return on his investment, the buyer of convertible debt also regards the exchange option as a "call" on the common stock. Once having faith in the upward course of the stock market, most investors are not likely to be deterred by the spread between market and convertible prices.

These characteristics of the convertible band have led to its ready adaptability to financing by General Dynamics and Lockheed. It is likely that this same medium may be used in other aircraft builders such additional capital funds for expansion or other corporate purposes.

8 - 11 -

- Most increased cash requirements is scaling from measured recruitment to instances in the company changes from certain government cost plus fixed fee-type contracts to target profit-incentive-type contracts, and from the recently established government policy of releasing various government recruitment

- Place a stayaway in a position to script orders at undesirable government projects (in addition to current contracts)

convertible debt, a non-principal purpose plus a desire to sell equity at a discount market. The



— Good will is the disposition of the pleased customer to return to the place where he has been well treated.

—H. J. Neiman (cont.)

ENGINEERING CORPORATION
2533 EAST 56TH STREET
HUNTINGTON PARK, CALIF.

the company's properties and facilities.

Glenn L. Martin

The Martin company previously had 5 million shares authorized, of which 2,672,281 shares were outstanding or issued for common upon the exercise of warrants and options. It is now authorized to issue up to 5 million shares.

The company has declared a \$6.5 million dividend currently proposed which would require the issuance of 1,000 shares of the authorized but unissued stock. When shares could in the future be used for the acquisition of another company or company, a

major, option to acquire or key man plan, stock dividends, etc. for additional capital is a favorable market for other corporate purposes or the distribution of dividends.

In other words, management has complete flexibility to add additional securities if it desires.

General Dynamics

The General Dynamics \$10-million issue of 54% convertible debentures was well received, being initially offered at \$128 (\$11,025) but increasing an additional \$10. The price of second \$15 (\$1,160) when first issue sold off to around 106 (\$1,166)



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A big attraction, here, as will be true with the Lockheed issue, is the conversion feature. The General Dynamics debentures are convertible into common stock at \$75 per share.

United Aircraft

United Aircraft has crossed stock holder interests in issue up to 75 million common shares. The 1981 proposed conversion was 5.5 million of which \$241,000 was still outstanding. Further, a new issue of 160,000 shares of preference stock was also authorized.

Also outstanding at the present time are 213,492 shares of the preferred stock of par value of \$100 each. This preferred was offered in 1962 shortly after Paul Hirsch, at a time when aerospace markets were overfilled. To make the stock attractive it was found necessary to set a 5% dividend rate.

Management, in April, stated "Under present conditions, the standing and financial position of the corporation do not seem to warrant the payment of such a rate. Accordingly, the board of directors has also decided to cancel the outstanding shares of the preferred preferred stock out of funds which, for the most part at least, it is expected will be generated from the sale of stock of another class, thus avoiding any additional reduction in the working capital of the corporation."

The directors plan to adopt a definite financing program at a meeting to be held after the annual meeting of stockholders on April 26, 1965, if market conditions should then be favorable. At the present time they have in mind an offering of new common stock to the holders of outstanding common stock, par value, in an amount sufficient to raise approximately \$20 million to \$5 million, to provide a total of approximately \$25 million in working capital for the company. This will be used to help finance the company's expansion program.

However, between now and the time of the annual meeting, conditions may change in such a manner as to lead the directors to favor some other program, such as an offering of part of the preference stock, if such stock is authorized by the holders of the common stock at the annual meeting, or the directors may determine to defer the new financing and the continuation of the present preferred stock for the time being.

Although no cashflow figure has as yet been available by United Aircraft, the company may be compelled to develop public finance as well (lead to the underwriting at \$142.50 per share) of its present preferred stock.

Further, it will have the means to issue quickly to raise additional short term for new capital to meet possible future needs."

—Sieg Albrecht



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Capital May Get N. Y.-Chicago Nonstop

CAB examiner's proposal would make CAP competitive with AA, UAL, TWA; favors limited Northwest service.

By Craig Lewis

Capital Airlines would become an effective competitor in the lucrative New York-Chicago air travel market under terms of the long awaited report of Civil Aeronautics Board Examiner William F. Casper in the New York-Chicago airway rate.

The decision would give Capital equal footing on the heavily traveled route with American, United, Delta and Pan American. TWA, Northwest and World Air also give Northwest Airlines a smaller share of the traffic with a restricted nonstop.

Here are the major recommendations:

- Reserve slotting on Capital's service between New York and Chicago, New York and Detroit, and New York and Pittsburgh
- Authorize Capital to serve Buffalo, Rochester and Syracuse between Detroit and New York
- Allow Northwest to serve Chicago on its Milwaukee-Detroit route with slotting
- Modify restrictions on United's service to Detroit to allow UAL to provide nonstop service between Detroit and Philadelphia. Restrictions on United's service between Fort Wayne, Toledo and Detroit would also be removed.
- Replace Eastern Air Lines' present "board-on" service at Pittsburgh with a long haul service requiring that flights serving Detroit, Cleveland and Akron/Canton from Pittsburgh originate in transients at Rossdale, Va., a point south of that city.

Application Delays

The report also recommends that a number of applications in the case be referred for consideration in other proceedings. American's application to serve Pittsburgh would be deferred for consideration with the additional Southwest-Northwest service case. United's Pittsburgh application would be considered with the Detroit nonstop rate.

Casper also recommends that TWA's request that Detroit be added as a point on its New York-Chicago route be put off for consideration with no investigation to determine whether the carrier's Detroit-Cincinnati segment should be shifted to another carrier.

area which is highly populated and industrialized and at a great gateway of traffic.

The issue involved in the case is basically the need for modification and expansion of present services in light of the tremendous expansion of traffic volume in the area.

The major carrier in the Chicago-New York area, American, United and TWA, currently have unimpaired authorizations for the route, while Capital must make two stops. Casper recommends removal of the restriction on Capital as the solvent of better service. The examiner will be split on the fact that Capital will be a nonstop carrier from five other carriers.

"There is a little doubt that the service being rendered by the existing carriers is adequate," says Casper. "However, the adequacy of the existing services should not operate as a block to further refinement in the route traffic pattern of other carriers or by such carriers from participating in the tremendous growth of this traffic."

Northwest Safety

The report also recommends that Northwest be allowed to enter the Chicago-New York market on a nonstop basis. Casper believes that the through service by improving load factors and removing transfer problems at Chicago, Northwest is the only transcontinental carrier which operates without support of Chicago traffic volume.

The recommendation on Northwest

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Amphibious S-55 Starts Tests

Amphibious S-55, fitted with new dual flotation gear and an ejection silencer, made light test at Westland Aircraft's Test, England, prior return delivery to British European Airways. The modified helicopter, BEA's second surveying transport, will inaugurate regular passenger service between London Airport and the South Bank next month.

would add Chicago as an intermediate point between Milwaukee and Detroit, providing that all flights serving New York, Boston and Chicago must originate or terminate at Minneapolis or points west, or at New York.

The changes would also serve by Capitol in the New York-Detroit route via Syracuse, Rochester and Buffalo, now served only by American. The New York-Buffalo segment of the New York-Buffalo route (the "shortest distance" competitor) to American, Capital is not a transcontinental carrier, the route looks like certification would cost less diversion from Newark than would the reinterior of Coast, another option in the future.

Another factor in the selection of Capital in the subshort-haul community

of interest between the New York cities and numerous cities in Michigan served by the carrier. Capitol also is more inclined for several of long-haul and one-stop notifications on its Detroit-New York route to provide additional on restricted service.

The report favors a change in East Coast's route at Pittsburgh. Currently, Eastern is subject to a "closed door" restriction which prohibits carriage of local traffic between Pittsburgh, Akron/Cleveland, Cleveland and Detroit.

Coast, though it would profit that all flights serving the three points from Pittsburgh be required to originate or terminate at Newark as far as each or either of the "closed door" regulations.

CAB Liberalizes Overseas Charters

A liberalized charter policy for trans-Atlantic travel that carriers were advised by Civil Aeronautics Board. Simultaneously, CAB authorized an investigation to determine if foreign air carriers should be permitted to perform all line charters.

The proposed trans-Atlantic charter policy, worked in a four-hour session with member Civil Aeronautics Board, abolished the previous restrictive requirements for an exemption that the charter to be performed be seasonal. They eliminated the right of first refusal to the regular carriers when charters are for the amount of one group or for long-haul military personnel.

The Board supports action that the new policy is properly extended for the summer season because necessary services may be made on the basis of experience that is gained during that period.

Although the intent is to provide greater opportunity for charter markets, the Board said it must proceed cautiously at first, not to jeopardize the existing scheduled trans-Atlantic services which are basic to an adequate air transportation service.

To minimize further the potential damage to regular scheduled services, CAB has also reduced the duration of charters contained in the commercial regulations.

This prohibits the offering by a third party of charters without the written consent of the carrier, and the performance by a third party of charter services for an individual, a group, a tourist or travel agent, or for persons paying for such charter services as a function of excess of the charter carrier's published charter rate.

Coast disagreed with the majority that there was no need for liberalization of the trans-Atlantic charter policy. It said, and was adopted in 1951 following a period of substantial experience, that the above liberal approach and use of excess of charters was not needed to move an air charter service along.

He contended that there had been no complaint from the public. Coasey said that under the present requirements, scheduled trans-Atlantic charter services are good and proper, while at the same time all legitimate charter services should be satisfactorily handled.

More Tourist Flights

Pan American-Gates Airlines will increase its tourist services to the west coast of South America to seven flights a week when it adds two DC-8 all-cabin flights involving Argentina and Paraguay, Chile, Ecuador and Peru.



Puerto Rico Opens New Airport

San Juan, P. R.—A new, \$15 million international Air Terminal has been inaugurated at the Bay Caribbean terminal.

The airport, managed by a consortium of American, Eastern, Delta, Cubanair and the Caribbean Air Carriers, is designed to accommodate a traffic volume which has exceeded all estimates and has a capacity of 750,000 passengers a year.

Opening of service at the international terminal brought in light a new tourist passenger change required by the airport authorities to focus attention on problems involved in housing tourist visitors.

The service change of 30 more, to be applied to all incoming passengers who want to go through customs, has been accepted with great reluctance by the airlines. Airport authorities insist that the change is necessary to pay for new construction funds which federal authorities are designating and authorizing. Gortons and Public Health.

The processing change, which will

apply to over 50% of passenger traffic, will be collected by the authority through arrangements with a collection agent.

The airport has a security terminal building which includes a 30-foot high, 100-foot wide, 7,000-ft runway, a second parallel runway is planned.

Soviet Airports

Russia has launched an ambitious airport terminal construction program at high traffic points throughout the nation, according to the official government newspaper Izvestia.

The chief administrator of the Civil Air Fleet approved plans for four new terminal buildings in 20 cities. Projects to be completed this year are at Moscow, Moscow, Kiev, Novosibirsk, Tbilisi, Alma Ata and Chelyabinsk.

Basis will be constructed at Moscow's Western Airport, and at Airports in Irkutsk, Omsk and Alma Ata.

He contended that there had been no complaint from the public. Coasey said that under the present requirements, scheduled trans-Atlantic charter services are good and proper, while at the same time all legitimate charter services should be satisfactorily handled.

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The airline, prepared to start the new service upon receipt of the DC-8s,

SAS Trans-Polar Flights Sold Out, Additional Service Planned in '56

Los Angeles—Scandinavian Airlines System's Polar Route between California and Europe has gained quick public acceptance.

The airline reports that its Polar flights to Europe are sold out for the next two months—the first summer season since the Polar flights have been available.

"We are only sorry that we do not have additional equipment to enable scheduling of one more flight per week," says SAS President Thomsen-Holm.

The current year makes three flights weekly in each direction over the route.

The third Polar flight was added a month earlier than planned in order to handle the increasing traffic. This makes available 416 seats per month, all of which are booked throughout through July and throughout through September.

To maximize further the potential damage to regular scheduled services, SAS has also reduced the duration of charters contained in the commercial regulations.

This prohibits the offering by a third party of charters without the written consent of the carrier, and the performance by a third party of charter services for an individual, a group, a tourist or travel agent, or for persons paying for such charter services as a function of excess of the charter carrier's published charter rate.

Coasey disagreed with the majority that there was no need for liberalization of the trans-Atlantic charter policy. He said, and was adopted in 1951 following a period of substantial experience, that the above liberal approach and use of excess of charters was not needed to move an air charter service along.

He contended that there had been no complaint from the public. Coasey said that under the present requirements, scheduled trans-Atlantic charter services are good and proper, while at the same time all legitimate charter services should be satisfactorily handled.

A few weeks ago the government carrier flew the second passenger flight, a charter flight, from the geographical North Pole near Scandinavia to Japan.

Two weeks ago the airline asked the Scandinavian government to approach the U. S. State Dept. for traffic rights between Anchorage, Alaska, and East Asia.

The airline, prepared to start the new service upon receipt of the DC-8s,

House Approval

The House passed the fiscal 1956 budget for Civil Aeronautics Board and Civil Aviation Administration without change in the recommendations of the Appropriations Committee (see p. 53).

use of the red until after 1955, a fate that had hung on 1955's \$4,967,230 loss.

This prediction was upset as Viscount had losses increasing to a point where it became a transport contract a \$100,000 per month loss to the BEA. Captain Everett Peter Mansfield.

With an unchanged fleet of Viscounts and 10 de Havilland Aircraft Ambassadors, British European earned 17% more revenue and carried 15% more traffic than in 1953. Operating expenses increased by only 4%. The airline carried 54% of the air traffic between Britain and Europe, covering approximately 25 million miles without a single fatality.

BEA's chairman, Lord Douglas of Kircaldy, admits the Viscount was less economical to operate on short hauls than the de Havilland Ambassador, but he also says the Ambassador's speed, range and lack of vibration made flying a smooth, pleasant experience.

The airline's utilization rate for its Viscounts is well over 2,000 hours a year.

Viscount Sales Gain

Viscount-Aeroflot's Viscount is strengthening its sales lead on other medium-haul transports. Last week the builder had probable contracts from two airlines plus two firm orders.

Possible buyers were Continental Air Lines and KLM Royal Dutch Airlines (AW May 23, p. 9). Firm contracts came from Trans-Australian Airlines for three more transports and from U. S. Steel Corp. for three business versions.

In London, Continental President Robert F. St. John, ending a two-week tour of Britain, indicated that the airline hopes to order 10 to 15 52-passenger Viscounts.

"Now we have to evaluate the statistics, but I should say there is very good hope of continuing Viscounts," he said. "We can get deliveries of the latter very early (1958) by August 1957."

Meanwhile, KLM Executive Vice President F. Beumer arrived in London last week for final talks with Viscount-Aeroflot about a Viscount contract.

The negotiations followed several earlier meetings with the builder by KLM President J. A. A. Beumer.

The Dutch carrier is considering a fleet of 16 Viscounts for delivery in two years. An order would be the first trans-polar purchase of a U.S.-equipped European airline.

In Melbourne, Trans-Australia announced the government had authorized the new Viscount contract. The latest order would be in addition to 10 transports already purchased, including one replacement for an aircraft that crashed last year.

Visco and its largest to have the first Viscount operating by the end of 1955.



SIMPLY STRAIGHT-LINE interior with depth to Allegheny Airlines new Martin 202-2s. Seating capacity has been increased to 44 for high density traffic.

Allegheny's Expansion Program Starts With Martin Transports

By Freddie Stover

Allegheny Airlines begins a new era in local airline service for the Middle Atlantic states next month with the inauguration of Martin 202-2s.

Augmenting its standard Federal DC-3 operation, Allegheny will put the latter 40-passenger Martin aircraft into service this week between Pittsburgh and New York and Pittsburgh and Atlantic City.

Expansion of the new equipment by Allegheny, for a successful operation of four Martin 202-2s and 14 Douglas DC-3s, is the latest development in the 15-year history of the carrier.

The introduction of Martin 202-2s on Allegheny's highly concentrated route slate 3000 miles of intra-state and intra-city air service between New York, Philadelphia, and the Middle Atlantic states, will not only the new aircraft and services but also enhance further modernization of the carrier's DC-3 fleet.

Sees Demand

Latest addition to Allegheny's route system is the inauguration of scheduled service in Timon, N. J., and stations east of about 40 miles between New York, eastern Pa., and New York, which had been dropped by Trans World Airlines.

Arrival of Allegheny's new aircraft and launching of its fleet was timed to meet the approaching heavier summer traffic requirements, a natural demand due to the carrier's expansion

and David L. Miller, vice president, traffic and sales, said: "We planned the Martin to meet the restructured demand. We needed additional equipment and had been looking for it. If it hadn't been Martin 202-2s, we would have been something else."

At the beginning of this year Allegheny had a fleet of 15 DC-3s. The new equipment program, initiated last two months ago, was completed in two transactions that resulted in fleet to a total of 15 trans-Jet Martin 202-2s and 34 DC-3s.

Allegheny acquired the first three Martins in a joint purchase with South West Airlines when the two companies currently total \$500,000 for the assets of Colorado Central Airlines, which included four 202-2s and a DC-3. The fourth Martin was obtained from Pioneer Aeromarine Services, a spin-off company established to sell Pioneer Air Lines' Martin equipment. Pioneer could the Allegheny DC-3 to South West Airlines.

Favorite Financing

Funding for all four new planes, plus spares and parts, was provided by the Chase-Manhattan National Bank of New York with Bage National Bank of Washington, D. C., also participating.

The bank took a 3-year, unsecured note at an interest rate of 11%. Leslie Bane, Allegheny's president, said: "We believe this represents the most

incredible terms yet advanced to a local service air carrier."

Southwest Airlines, the only other local carrier on route now operating 202s and Glenn L. Martin Co. of Baltimore, Md., builder of the aircraft are assisting Allegheny in the operational transition to 202s.

Allegheny is sharing its cost and operating experience with Allegheny Glass L. Martin Co., located only 43 miles from Allegheny's headquarters at National Airport, Washington, also a competitor.

Allegheny is not concerned about flying the 202s. Martin officials state they are believed to be the highest cost offered by any local service airline. Miller explained that a good percentage of Allegheny's current passengers are now "on the list" and the summer season is only beginning.

"There is no question but our traffic will substantially increase," Miller said. "Our best flights have been running at a 75% load factor, which is about a 1/2 load less we handle with so many intermediate stops."

Uniting Steps

At present, Allegheny is scheduling just 10% of its three Martins now on hand.

The load phase is now being kept in productive schedule, because until the fourth is delivered. At that time, probably in July, three Martins will be fully scheduled on the company's heaviest transited routes with the fourth en route.

Allegheny is trying to limit its Martins to only three intermediate stops between terminals. This can be done with a non-stop drop-off authority from the Federal Aviation Admin., Allegheny will request to maintain its authority of holding intermediate stops to a few for reasons which is done by cutting out one engine for simultaneous unloading and loading.

It has been estimated that the Martins will mean a 30-minute saving per flight or a gain of one hour per day per plane as service. Initially the three daily flights with the 202-2s is anticipated with a gradual increase up to six and eventually seven hours daily unloading and loading.

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As part of its new program, Allegheny has adopted an "economy" fare for its passenger and advertising. First they will be using the 202-2s "Martin Economy." Allegheny also has taken the name of "The Aviation of the Twenties." Its seven-city system is called "The Route of the Twenties." Company officials believe the "economy" fare is highly appropriate for air service in the Middle Atlantic area. Recent Allegheny traffic surveys show that 50% of the airline's passengers are traveling solely for business reasons.

House Unit Increases Airport Funds for '56

House Appropriations Committee has allocated airport development funds for Fiscal 1956 to \$20 million, nearly double the \$10 million proposed by the Administration. The \$9 million increase will be the first increase in Congress to accelerate the airport program.

The committee and the \$20 million, plus \$7.5 million to liquidate existing contracts, would provide enough to continue at the Fiscal 1955 level. The \$7.5 million for 1955 exceeded \$2 million for administration, included \$1.6 million in another category.

Minority Rep. Otto Harris, chairman of the Transportation Subcommittee of House Commerce Committee, followed the lead of Sen. Mike Monroney, chairman of Senate Committee on Aviation Subcommittee, and introduced legislation authorizing an appropriation of \$16 million annually for airport development for the next four years (AW 9, p. 111).

The House Committee approved an over \$7.5 million Fiscal 1956 budget for airport administration. Also, a \$16 million, plus \$2 million for the \$10 million proposed for 1955. But \$16.5 million of the increase is to liquidate contracts already made.

The appropriations unit made the following reductions in Administration requests for funds in other GAA categories:

- Operation and regulation, \$101 million. This is \$3 million less than the \$104 million requested. It provides for administrative activities at the same level as Fiscal 1955. The committee directed that the cut should be applied "as just a measure that safety in aviation will not be affected." It suggested that \$101,000 be taken from the \$104,000 for a special technical service and \$40,000 for a project to transfer safety responsibility to industry "so can be eliminated without affecting aviation safety."

- Establishment of air aviation facilities, \$11.5 million, plus \$7 million to liquidate previous contract authorizations. Although \$10.5 million below the Admin. budget's impact, this is also \$1.5 million more than the \$3 million provided for this activity for 1955. The committee directed to GAA's discretion whether the funds allocated are to be used for new BAA terminals.

- Air navigation development, \$1.35 million. This is the same amount as proposed for 1955 and \$500,000 less for the Administration's request.
- Washington National Airport, \$1.25 million. The sum as proposed for 1955, this is \$50,000 below the budget request.
- Alaska airports, \$600,000 for agency

hairs and maintenance. This is the same as the Fiscal 1955 allocation but \$150,000 less than requested.

The committee voted the full \$125,000 requested for construction, to provide for additional passenger storage facilities, sun power, additional big game facilities, stabilizations and replacement of field markings and lights, an emergency electrical generator, and improvement of fire protection facilities.

\$23 Million Reduction Made in 1956 Subsidy

Fiscal request for airline subsidy amounts as Fiscal 1955 was reduced by \$23 million by House Appropriations Committee.

The \$45 million voted by the committee is \$11.5 million less than the \$56.5 million provided for Fiscal 1955. Civil Aeronautics Board reported that it is \$3.7 million short of the amount needed to meet claim.

The committee allowed \$121,000 increase over Fiscal 1955 appropriations in GAA administrative funds to strengthen the safety program in the hope that it may prove sufficient to eliminate the "economy" fare. It will make it possible to reduce subsidies funds in the future. The \$1.9 million the committee recommended for administration, though, is \$275,000 less than the amount proposed by the Admin. administration.

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- Washington National Airport, \$1.25 million. The sum as proposed for 1955, this is \$50,000 below the budget request.
- Alaska airports, \$600,000 for agency

CAB ORDERS

(May 12 '55)

GRANTED:

Transocean Air Lines' exemption to operate one flight from Milan, Italy, to New York carrying religious and their baggage pursuant to a contract with the International Committee for the Interfaith Pilgrimage.

Frontier Aviation's authorization to start service at Princeton, West Va., as an intermediate point on segment 2 of Route 37 on flights en route to those daily round trips.

General Airlines' exemption to operate one nonstop passenger charter flight from Mex. 10-12 between Chicago via Pinal, Mex., and La Paz, Mex. A 10C-3 will be used in this flight at a charter rate of \$4,182.

APPROVED:

Establishing airservice among Collected Air Force, an international air freight forwarder, Volante West Express, a general aviation express company, and Volante Service Co., a motor carrier and among Randolph, A. C. (Collected Air Force), and Collected Air Freight Canada as individual vehicles.

Agreement between Northwest Orient Airlines and American Airlines and various other air carriers relating to intercarrying arrangements.

DISMISSED:

Authorization of service to Boca Raton by Enviro Air Lines to withdraw voluntarily from business.

Stock Away's complaint against method of fare calculation from Los Angeles to Phoenix to Chicago, Detroit and New York, proposed by American Transocean Freight Traffic, since the rates have been lowered.

Application of David M. Segal for a permanent certificate of public convenience authorizing him to serve the communities of Tonawanda, Tonawanda, Erie, Alden, Hamburg, and Buffalo, New York. The reason that the \$6.3 million deficit in bonds will possibly affect material normal service.

Yan Ai Lines' application for exemption to pay lower rates of compensation for planes to be used as mail in view of nature of application the airline's operating as planes.

DENIED:

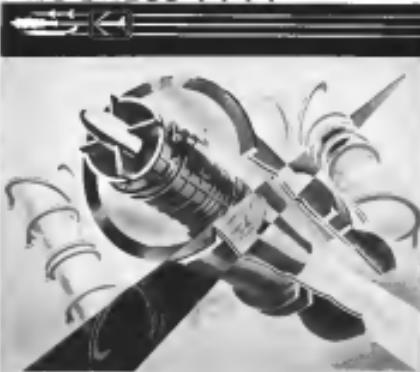
Western Air Lines' application for a permanent certificate to extend its route 13 from the intermediate point of Tucson, Ariz., to the terminal point of Phoenix, Ariz.

Application of the City of Springfield, Ohio, to have the intermediate point of Dayton, Ohio, redesignated as Dayton International Airport, from West Dayton, Ohio, Route 2, Dayton, Ohio, to West Dayton, Ohio, Route 2, Dayton, Ohio, to be avoided through the Dayton Municipal Airport.

Request of the County of Monroe, N. Y., for reconsideration of CAB's decision adding Tewantin, N. Y., to the certificate of Allegheny Airlines route as it failed to provide for north-south air service at Tewantin.

SHORTLINES

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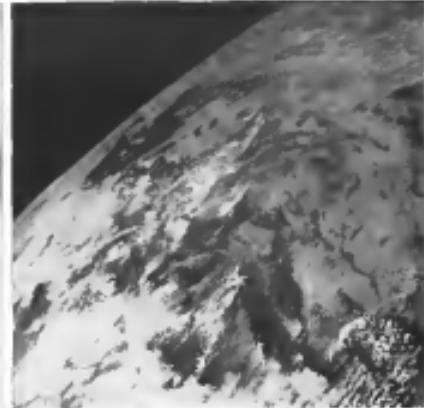
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EDITORIAL

Evasions In The Defense Department

The Washington press corps and the American people in whom their report have been given neither seen demonstration of the nucleus, armament and evasion nature in which the Department of Defense publicly handles matter of life and death concern to every citizen.

The occasion of this latest demonstration was a press conference held by Defense Secretary Charles E. Wilson last week in the Pentagon during which he confirmed details of the types and numbers of Russian bombers and fighters exclusively reported by AVIATION WEEK as on May 23 were in fact having participated in the recent aerial display over Moscow.

Here are some examples of what we and other veteran Pentagon reporters consider to be evidence of this callous attitude toward vital facts by top level Defense Department civilian officials.

On May 11 the Defense Department issued a brief, vague statement on the Moscow air display mentioning four types of Soviet planes. AVIATION WEEK reported on May 23 that these types appeared in operational numbers and a new supersonic dog fighter was seen in formation of 50 planes. Our story was widely reprinted on the front pages of daily newspapers and broadcast on radio and television on the same day. On May 24, the next day, Secretary Wilson issued a statement confirming the appearance of the 50 supersonic fighters and ran forward the names of all another fighter, turboprop bombers, two jet bombers and four jet bombers cited by AVIATION WEEK as visible in the Moscow fly-by.

Questions and Answers

When asked by AVIATION WEEK's military editor why these facts were not in the original Department of Defense statement, Mr. Wilson replied:

"The statement on May 11 was a very general one."

Mr. Wilson was asked by AVIATION WEEK's Washington editor if he planned to release publicly the pictures of these Russian planes flying over Moscow that are now available in the Pentagon. He replied:

"Hadn't thought about it."

When asked if he had changed his mind from a year ago when he stated the Russians were concentrating on building a purely defensive Air Force, Wilson said:

"Well, I am afraid we've very mass emphasis to fight a war with and there isn't any question that the first big deployment of Russia is on the MiG's, the defensive aircraft and they had a lot of them. They probably kept building them too long from our point of view. We would rather have spent the money on an improved and better one quicker. That is the technique over here."

Mr. Wilson knows or should know that the MiG-15 went out of production in Russia late in 1952 after 15,000 were produced. This was the year before Mr. Wilson made his "defensive" statement.

He also knows or should know that we are still building the F-100 Sabre series that was the MiG-15's counterpart.

He should know that we did not get into production on the F-100, successor to the Sabre, until late in 1953.

He also knows or should know that by July 1956 Lt. Gen. Leslie Farnsworth, commander of the Far East Forces, reported that the MiG-17, the Soviet successor

to the MiG-15, was steady in quantity service with Red Air Force units opposite PEAFF in Siberia. The first F-100 combat wing was equipped late in 1954, grounded for several months due to technical troubles, and became operational early in 1957.

Misquotes President

Mr. Wilson also misquoted President Eisenhower in his formal prepared statement: Mr. Wilson and the President said in his news conference last week, "it is not true that we no longer have an superiority." What the President actually said was "... we may not have as many B-52s as we should like at this moment. I don't know the exact number, but to say that we have lost in a ranking all of this great technical development and technical excellence as well as the number in our total aircraft is just not true."

Nobody has stated we have lost anything "in a ranking." What AVIATION WEEK and other critics of the Defense Department attitude on Russian airpower have said is that the 1955 Moscow air display offered definite proof that during the past three years our once wide margin of technical superiority had been whittled to a very slim margin and that Russians are moving at faster rates of development and production now than are the U.S. Air Force and Naval Aviation. Neither Mr. Wilson nor anybody else in the Pentagon or White House has taken direct issue with that statement.

The May 13 Department of Defense statement stated that the Russian bombers display "observatory established a NEW basis of test estimate of Soviet airpower." In his May 24 statement, Mr. Wilson said on the same subject: "These are facts which are NOT NEW to the Department of Defense but which are currently causing public discussion about the relative air superiority of the United States."

Mr. Wilson is still apparently confused about how many MiG jet fighters flew over him. He said: "They displayed more than 40 new medium bombers known for the first time last year (1954) as a prototype." Actually, on the 1954 Moscow air display the Russians flew a formation of nine of these twin jet medium Bombers, indicating at that time that they were out of the prototype stage and into production.

Events of the last three years have proved that Mr. Wilson has been wrong on every major estimation he has made on Russian airpower developments since he took office in 1953. His performance at the Pentagon press conference last week as that of vital importance to every American did not inspire any new confidence in his accuracy or candor on the rapid rise of Russian jet airpower.

Nor did it inspire any confidence that Mr. Wilson's new requirement that all Defense Department public statements must make a "constructive" contribution will be administered either wisely or well.

The American people deserve more precise and accurate facts more candor and a much deeper sense of public responsibility on the part of top level defense department heads before they should place much faith in official statements on the Russian airpower controversy.

—Robert Bots

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